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APPALACHIA

THE JOURNAL OF

THE APPALACHIAN MOUNTAIN CLUB

VOL. X

1902-1904



Published for the Appalachian Mountain Club by
HOUGHTON, MIFFLIN AND COMPANY
BOSTON AND NEW YORK
The Riverside Press, Cambridge
1904

May 10, 1926
**SCHOOL OF
LANDSCAPE ARCHITECTURE
HARVARD UNIVERSITY**

3543

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Photomontage

John Andrew & Son

AT THE SOURCES OF THE ATHABASCA
(MT COLUMBIA?)

From a Photograph by Jean Habel

APPALACHIA.

VOL. X.

BOSTON, MAY, 1902.

No. 1.

The Ottertail Group, Canadian Rockies.

BY JAMES OUTRAM.

Read November 19, 1901.

THIS picturesque group of fine peaks, surrounded and intersected by beautiful valleys and containing several striking glaciers, is practically unknown save from afar, yet it is without doubt one of the most interesting corners of the Rocky Mountains, and possesses attractions far beyond the ordinary for the artist, scientist, and mountaineer.

The noble, snow-crowned summit of Mt. Vaux is a conspicuous and magnificent object from the Emerald Lake region and the heights round Field, and it is also visible from the railroad track west of that station. Seen from the Emerald Lake on a summer's evening, softly glowing with the delicate rosy lustre, or flashing brilliantly beneath the red-gold glory of the sinking sun, framed by the dark rocks and sombre pines of the southern portals of the intervening valley, its graceful form and wondrous hues reflected in the peaceful, paling waters, Mt. Vaux presents a picture to live forever in the inmost shrine of one's most cherished memories.

The Chancellor, again, that mighty pyramid whose frowning precipices, black and forbidding, loom aloft nigh upon seven thousand feet above the Wapta River, cannot fail to impress the traveller with a sense of awe and grandeur, as he approaches eastwards from the grim gateway of the Lower Wapta Canyon or passes along its base at Leancoil.

Mt. Goodsir, however, the third great peak of the group, greatest and grandest though he be, is scarcely known to any

2 THE OTTERTAIL GROUP, CANADIAN ROCKIES.

but the few who have been privileged to scale one of the loftier heights along the line, although the western tower, remarkable, even in the diminution of distance, from its massive character and striking overhanging attitude, and the main peak behind it, can be seen from the windows of the railroad car at the far end of the vista of dark cliffs and rugged points that overtop the wooded southern slopes of the Ottertail valley. From almost every mountain top and some honored few of the lesser and more accessible altitudes within an immense area of the Rocky Mountain and Selkirk ranges, the triple mass of Mt. Goodsir is a marked feature of the landscape, towering aloft a thousand feet above the tallest of its immediate neighbors, striking in form and impressive in stately grandeur.

The area covered by this splendid trio of mountains and their lowlier attendants is roughly rhomboidal in form, with sides ten to twelve miles in length, bounded on the east by Goodsir Creek and the headwaters of the Beaverfoot River, which turns at an acute angle round the southern extremity and continues as a boundary towards the northwest; westwards, by Wapta River, and on the north by the Ottertail Creek. In the centre, the mountain mass is cleft by a narrow V-shaped valley, down which a rushing, swirling torrent pursues its headlong course; a beautiful spot, cradled between the double ranks of rugged, snow-hung crags that form the ridges trending southwards, peak on peak, from Goodsir's and the Chancellor's proud eminence.

Far up, the valley-head is closed abruptly by a wall of cliffs, down which the gleaming, broken waters of some picturesque cascades leap from ledge to ledge, like threads and bands of silver, from the upper slopes of snow and glistening parapet of ice that crowns the whole and acts as sponsor to the river and its valley-bed.

Another interest of this small but fascinating gem of Nature's handiwork is found in its peculiar formation from a geologic point of view. Almost alone and to by far the greatest extent, so far as is at present known, amongst the hosts of ranges in the Rocky Mountain chain, the present group provides exception to the nearly universal Middle Cambrian to Lower Carboniferous strata, and here a belt of syenite runs right athwart the centre of the limestone mass from east to west, severed itself by the sudden cleavage of the Ice River valley.

Considerable mineral wealth is likely to be stored within the rocky treasure-house of these everlasting hills : zinc, mica, sodalite, and the richer ores have already yielded their quota to the miner. And, yet again, it is a region for the sportsman ; the woods that clothe the lower slopes, the bleaker ridges, and the broken crags harbor the bear and deer and offer advantageous haunts for mountain goats, whilst silvery trout gleam in the streams below.

Albeit thus so prominently situated in full view of railroad engineers, surveyors, and the countless throng of tourists, journeying along that peerless scenic line, the Canadian Pacific Railway, since the days when Dr. Hector, as far back as 1858, skirted the mountains' base as he proceeded down the Beaverfoot and up the Wapta rivers, pausing at the mouth of the Ice River ; past the far later date of 1885, when Dr. Dawson visited the region in his geological survey ; but for an Indian hunter now and then, or a stray prospector passing through in search of richer prey, the beauties and the grandeur of these vales and peaks have lain unnoticed, unappreciated all these years.

Such is the district whose rumored treasures filled the hearts and minds of at least three poor mortals with eager desire to explore : treasures of scenery, of healthful vigor, and of boundless opportunity. There rose a number of untrodden peaks with every prospect of the joy of genuine difficulties to be overcome — this for the mountaineering section of the complex man. There, from the summits of these lofty tops, would extend an almost limitless array of Nature's noblest monuments, with their attendant valleys, streams, and lakes, partly unmapped and, at the best, their altitudes and relative positions insufficiently determined — this for the scientific and the artistic side. And thus the prospect of a grand satiety for all : the artist, the athlete, the fighter, the explorer, and the scientist in each of us, raised high our spirits and nerved us for the toil.

It came about on this wise : —

A year before, I had the pleasure of meeting with a member of the Appalachian Club, J. Henry Scattergood, of Philadelphia, at Lake Louise, and he joined my brother and me in an ascent of the north peak of Mt. Victoria ; this, added to other pleasant intercourse, resulted in a compact that, if we both should be

4 THE OTTERTAIL GROUP, CANADIAN ROCKIES.

among the mountains in 1901, we should climb in company. Mr. Scattergood is the pioneer mountain climber of the Ottertails, and every reader of *APPALACHIA* must have been interested in his recent account¹ of his journey up the Beaverfoot valley and ascent of Mt. Mollison. So naturally his inclination lay in this direction, and the Ottertails were agreed upon as our primary objective.

Some months later, Professor Fay, who had come out in 1899 with designs on this particular group,² wrote to Mr. Scattergood, asking him to join him in the summer, and I was most delighted to have the privilege of the association with our party of one whose fame is so far-reaching as an authority upon the Rockies.

Christian Häslar, of Interlaken, the Swiss guide stationed by the Canadian Pacific Railway at Field, B. C., was unanimously selected to complete the quartette; and, without hitch, our plans were brought to pass, and all were gathered in the hospitable hotel at Field, ready for a start on Monday, July 15.

Miss Mollison, our incomparable hostess, the late Mr. Duchesnay, and Mr. Carey of the Canadian Pacific Railway, with kindly interest afforded us all possible advantages, and helped our expedition in many ways; and on a bright morning, seated on the cow-catcher of a locomotive, surrounded by impedimenta of knapsacks, ropes, and ice-axes, we were speeding down the grade en route for Ottertail bridge, from which point we were to leave civilization as represented by the Canadian Pacific Railway and a miners' shack, and plunge into the solitude of the mountain fastnesses.

Mr. Lindsay, the owner of a silver-lead mine close to the bridge, gave us a hospitable welcome and a hearty send-off, entertaining us at dinner and supplying us with some information about the valley. Then, shouldering our packs, at one o'clock we started off with his good wishes ringing in our ears.

A recently constructed trail leads for some miles up the valley, which heads in towards the southeast for some miles, though it is overgrown in places in a southeasterly direction; moreover, it is occasionally blocked by fallen timber, over or under which we were obliged to climb or creep. A hot sun and the weight of our baggage made us glad that we had but a

¹ See *APPALACHIA*, vol. ix. p. 289.

² *Ibid.* p. 280.

short programme for the day and plenty of time. We followed the trail for about three miles, most of the way high above the rushing stream, and later converging towards it, till we crossed the torrent by a rustic bridge, close to its junction with a tributary from the south, and meandered up the banks of this smaller branch, named Haskin creek. The ancient trail assisted us for some little distance, but soon we were obliged to turn into the trackless forest that clothes the eastern slopes.

The chief disadvantage of present-day mountaineering in Canada is the laborious nature of travel below the timber-line. Trails are few and far between, often ancient, overgrown, and covered with fallen tree-trunks; sometimes they are practically only blazed, and frequently are absent altogether. The undergrowth is generally very dense, and forest fires have so devastated the wealth of noble firs that millions of logs, in varying stages of decay, frequently blackened and charred by the destroying flames, cover the slopes and valley-beds with an intricate network of huge obstacles, oftentimes piled upon one another like an overturned boxful of titanic safety matches.

This afternoon, however, we were fortunate: the grade was steep, but the woods were comparatively easy; still, the weighty packs upon our unaccustomed shoulders, all out of condition as we were, gave us work enough.

An open-air bivouac and the uncertainties of mountain exploration necessitate considerable impedimenta. Between us we bowed beneath the accumulation of two days' provisions, changes of garments, blankets for the night, mackintoshes, aneroids, compasses, levels, and other minor paraphernalia, including a large axe. Our leisurely ascent continued till 6.30, when we reached the timber limit and sought a snug location for the night. Unfortunately our desire to be as high as possible outweighed our discretion, and, while wood was plentiful and shelter abundant, the third desideratum of a camp could not be found in combination at that altitude, and the nearest water was fifteen minutes' scramble from our halting-place. Rather than descend, we made a pilgrimage to the cascade and had our supper at its side, returning to the shelter of the trees, where we built a huge fire, cut down pine branches for our beds, rolled ourselves in blankets, put our boots beneath our heads, and wooed sweet slumber with more or less success.

Morning began to dawn with fair promise : we struck camp at 3.50 and halted a quarter of an hour later by the stream for breakfast, — a somewhat chilly repast, owing to the early hour, the frost of the previous night, our exposed situation, and the ice-cold beverage which did duty instead of tea. At 4.40 we were again on the march, striking upwards towards a noticeable dip between Mt. Hurd, the northern outpost of the massif, and Mt. Vaux.

An hour's steady going over firm snow and easy rocks brought us to the base of a steep snow curtain, up which we zigzagged, and soon stood upon the broad expanse of Hurd pass, face to face with a resplendent vision of snowy ranges, glistening in the morning rays, as peak after peak of the mighty Selkirks pierced the sky. Several of these, Sir Donald, Dawson, Eagle Peak, and others, were recognized as old friends, but more interesting even than they were the steep sides of Mt. Vaux, now first revealed to us at close range. We were relieved to note that the one hitherto unseen portion of our projected route appeared quite feasible ; for we had no previous knowledge of the character of one intervening section between Hurd pass and the upper elevations of Mt. Vaux, which might have presented difficulties insurmountable.

After a halt to photograph and enjoy the landscape, we turned southwards and entered on a rocky scramble along a broken, jagged arête for nigh upon an hour, stopping at 7.30 for a brief repast on a narrow col at the base of a lofty, very steep snow dome that barred our progress towards the highest peak and had to be surmounted. This proved the most fatiguing portion of our climb : the acclivity was at a very sharp angle ; it rose fully eight hundred feet above us ; and, laden as we were, on this our first ascent of the season, breath soon became a scant commodity. Twice we stayed for a brief respite ere we gained the summit at an altitude of about 9950 feet.

From this coign of vantage we had an unobstructed view of Mt. Vaux's topmost glacial peak immediately in front, offering an easy access to its hitherto untrodden pinnacle. A glorious view of our three objective mountains was disclosed : Mt. Vaux, in spotless purity, with giant cliffs abruptly falling to the Wapta on the right and the stately flow of its magnificent

HUNTER HARTS GRAVE

"KNOX CORNER"

VAUX

GOODWIN

CHANCELLOR



THE OTTERTAIL RANGE FROM MT. HUNTER.

From photographs by the Dominion Topographical Survey.

glacier trending majestically to the left, walled in by the low parapet that, on its further side, drops almost sheer into the Ottertail.

Above it rose the black, forbidding precipice of Chancellor, fringed to the east with hanging glaciers; and further yet, the awesome western tower of Goodsir, with its castellated buttresses and almost overhanging northern face.

One only drawback threatened in the mass of ominous clouds that were now sweeping towards us from the western ranges and across the Beaverfoots; so we descended hurriedly to the dip that separated us from the highest peak, and, leaving our packs upon the snowy col, climbed the slope of *névé* that sweeps away below us to the southeast, bearing well to the left to avoid the great crevasses that barred a direct approach, and circling towards its narrowing final ridge.

Long ere we gained it, we were wrapped in clouds: hail fell with tingling force, swept by the rising wind; flashes of vivid lightning cleft the murky curtain of advancing storm, and thunder crashed above us and reëchoed far and near from crag to crag. Thus we struggled upward to our goal, at length arriving on the snow-clad apex, where in front the precipices yawned in awe-inspiring suggestion of immensity below, as through the wreathing, billowy clouds we looked down into space apparently unlimited.

For half an hour we huddled on this narrow ridge of snow, some 10,600 feet above sea-level, with the thermometer below the freezing point, whitened with falling flakes and hail. Occasional fleeting but precious glimpses of the world around were gained; no simultaneous panorama, but spectacular effects of peak and vale, gleaming in sunlight often, beyond the pathway of the transient storm. With chilly fingers, aneroids, level and compass were manipulated at lucid intervals, but at 11.15 we deemed it best to beat an ignominious retreat, and ran down rapidly to where our rucksacks lay almost engulfed in snow. Thence we followed the glacier, glancing up at the Chancellor again and again, to see if any route suggested itself up the rugged northern side, but in vain.

The weather rapidly improved, the sun shone out again, and the views extended, though the loftier peaks were mostly veiled in

mist. By good going over easy snow we soon arrived at the rim of the great cirque of ice-hung cliff and craggy steep, which closes in the head of the Ice River valley. It lay below us in its beauty: the brightness of its verdure, far beneath us, threaded by the clear, winding river, sparkling in his tumultuous course; the sombre pine-clad slopes that merge in snow-tipped pinnacles, bare, rugged cliffs and beetling, broken crags; and away beyond its bounds, in striking contrast, a line of bright, distant mountains closes in the view.

It was with feelings of satisfaction that we descended, far down the river bank, a small white tent, sheltered by trees, with curling smoke hard by, and horses tethered in a rich tract of pasture beside the water's edge. This was to be our home for the next few days. Our packer, Ross Peacock, had come up by the Beaverfoot trail, and now awaited our arrival by the untried route over the mountain wall.

Snow slopes led steeply downward, affording some glissades, until the cliffs arrested progress and demanded careful searching by ledge and cleft, to find a passage to their base, and caution during the abrupt descent. Eventually, after an awkward crossing of the foaming glacial torrent and a swift glissade over the hard snow at the foot of the cliffs, we reached the valley and made our way along the river bank, plunging through thickets of alder and willow, crossing and recrossing the ever growing stream, till finally the welcome camp appeared, and Peacock greeted us with voice and teapot.

A bathe in the swift-flowing, ice-fed creek was the first delight, and then we looked around our new quarters to make arrangements for the night.

At the first blush, things did not seem too grand: for a misunderstanding as to the supply had most unfortunately been made. The tent would hold but three, and kitchen and dining-room utensils were provided only for a solitary man. However, there was food enough to last the week out, and to a cheerful party like ours, the situation was not bad enough to spoil our appetites or joviality. Forks, spoons and ladles soon were fashioned out of wood, smooth slabs of stone did duty for the plates, condensed milk cans, retired from public life, made admirable cups, whilst for the night, a lean-to, formed of poles and boughs,

provided a most superior sleeping apartment, in which Scattergood and I took up our abode.

An excellent supper and a lovely night succeeded, with well-earned rest till far into the morning, which was spent in laziness and minor occupations. Häslar displayed great ingenuity and skill in fixing up an ice-axe, the shaft of which had broken off close to the point, and which was now re-pointed as a baby axe some thirty inches long. Peacock was busy baking bannocks for our next expedition, and some of us had tailoring to do.

In the afternoon we started off to camp high up, preparatory to an assault on Goodsir on the morrow. From our headquarters, at an altitude of about 5000 feet, we walked some little distance down the valley, then turned to the left, up the steep sparsely timbered slope to round the rugged shoulder of Mt. Goodsir's southwest buttress. Here tracks of bear were seen, but we had not the good fortune of our packer, who, the previous afternoon, close by the camp, had watched for a full hour a large-sized grizzly disporting himself on these very slopes.

A stiff and steady pull took us to timber-line, and, turning into the lofty torrent valley that drains the southern side of Goodsir, that splendid mountain burst upon our gaze.

Across a rough expanse of débris, rose the titanic mass, crowned by a long, serrated sky-line with three huge peaks, from which its mighty ribs and snowy couloirs descend to meet us, overhung with rugged cliffs and broken pinnacles; westwards, the formidable, bare, black tower, that had been visible along the line of our approach from Field; eastwards, the thin-ridged triangle of the highest point, set obliquely on a high-pitched gable; and between the two, a smaller peak rises upon the sharp connecting ridge.

On the green tongue that forms the base of the great central buttress, under twin trees that make a spreading canopy above our heads, we bivouac some 6800 feet above the sea, beside a tiny brook. The fire lighted, fuel gathered in, branches collected for our couches, all things made snug, we sup in luxury and lay us down to rest, conscious that next day would bring us genuine work to do, a giant to be wrestled with, one of the noblest in the land.

With brilliant radiance, Jupiter, the evening star, rose over

the ridge of Goodsir, and soon the cloudless heavens were studded close with gleaming stars, which kept watch over us, whilst the murmur of the falling water crooned a lullaby.

An early rousing was in store for us. Breakfast was quickly over, our blankets and superfluous baggage hung in the trees, to keep them from the inquisitive and voracious attentions of the marmots, and at 8.45 we were on the march.

Crossing the tongue of snow to the east, we commenced the ascent by the long ridge leading to the prominent eastern shoulder of the chief summit. The gradient at first was easy and the going fairly good, so rapid progress was made. High up we passed one of the locating-posts of an adventurous prospector's claim, and after ascending two thousand feet in an hour and a half, reached the first snow upon the ridge. Slopes of talus and broken rocks marked the way for another seven hundred feet, and here, at about 9500 feet, we roped at six o'clock.

The character of the climb soon changed. The arête grew steeper, narrower, more broken. The rocks, like those of almost every mountain in the Rockies yet explored, were friable and often broke away at the slightest touch; sometimes large pieces of an apparently solid mass would split off or tear away when least expected. This in itself necessitates incessant care. Snow, too, was fairly thick and covered treacherous holds, and here and there the rocks were glazed with a thin coating of fresh ice, which added largely to the difficulty of the way.

Our progress consequently became extremely tedious, yet it was progress. Now we were balancing upon the attenuated crest of a steep ridge; now traversing beneath a spire we could not overtop, edging along the slippery ledges above deep ravines, down which loose stones were bounding in a suggestive fashion to join the mass of débris far below.

Two hours and a half in covering thirteen hundred feet was certainly not a rapid piece of work, but it was full of interest almost all the way. We were not a rapid party, but we had heaps of time; and now we halted for a rest and breakfast, feeling that both were fairly earned and thoroughly enjoyed.

Here in our lofty eyrie, 10,800 feet above sea-level, already a hundred feet or so above Mt. Vaux, we drank in the pure air, and rejoiced in the scenery around us. To the north and north-

VAUX

BALFOUR

F



NORTHEASTERLY FROM CHANCELLOR PEAK.

VICTORIA

LEFROY

HUNGABEE

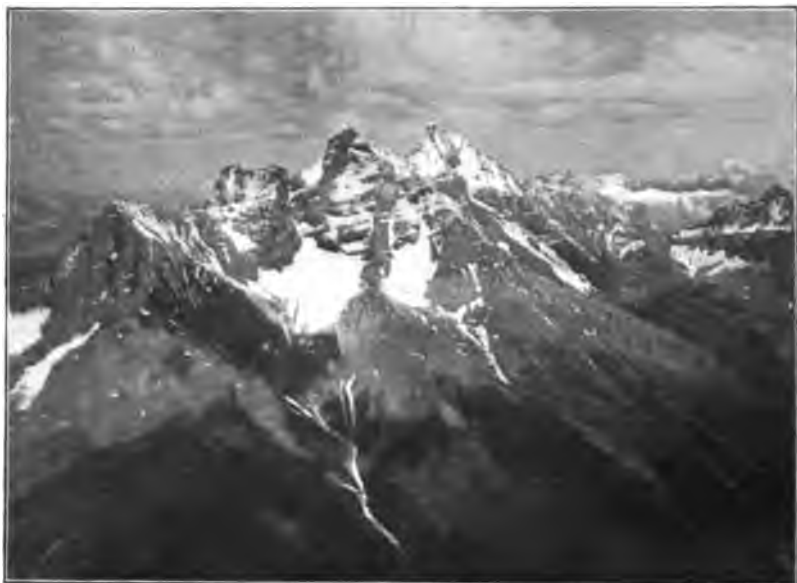
TEMPLE

DELTAFORM



EASTERLY FROM CHANCELLOR PEAK.

From photographs by J. Outram.



MT GOODSIR FROM CHANCELLOR PEAK.

From a photograph by J. Outram.



THE "SNOW DOME" FROM HURD PASS.

From a photograph by C. E. Fay

west, our mountain was all our view; but beyond the jagged arête of our ascent, with glistening cornices overhanging its upper rim, rose in the foreground the boundary range between the Ice River and Beaverfoot head-waters; across the former valley, Chancellor and his long line of attendant peaks; above, beyond them all, stretching to either side as far as eye could reach, white crests, sharp pinnacles, and glacier fields — the Selkirks, monarchs of the western realms. Yet further to the left, the mountains bounding the Vermilion valley are the first to catch the eye, then far Mt. Assiniboine, a head and shoulders taller than his fellows, Mt. Ball, and countless lesser eminences.

But there is plenty to be done before the day is ended. A few minutes bring us to the angle of the eastern shoulder, and an extremely narrow, nearly horizontal ridge intervenes between us and a ruddy cliff that forms the base of the great final peak. It is a picturesque, yet fearsome ridge. A spotless curtain of pure snow hangs draped by Nature's supreme hand on either side, as steep as snow will cling, corniced along almost its entire length of some four hundred feet, with delicate, clean-cut crests, some large, some small, and two reversed. We balance sometimes on its narrow edge; anon we traverse gingerly along the slopes of snow, a soft insidious "hiss," of wonderful suggestiveness, greeting each step, as the top snow slides downward at the touch, and, gathering speed and volume, races to the bottom in a miniature avalanche.

Thus, forward to the cliff, a straight-up, almost smooth wall a hundred feet or more in height. At first, gymnastic exercises, with scarcely a crevice for hand or foot to rest upon, are needful; then, bearing round above the glorious depths of the precipitous northern face, we find a cleft, up which we clamber carefully, for stones are loose and cannonade the men below, and finally emerge upon another narrow, upward-sloping ridge.

As I, who am last upon the rope, appear above the edge of the big buttress, I see by my companions' faces that all is not well. The prospect of defeat is staring us full in the face.

A marvellous ridge it is, worth coming all this way to see, even if it means defeat. Far longer than the last, far narrower. A snowy curtain still depends upon the right, stretching into

depths five to six thousand feet below, and much too steep to dream of setting foot upon. Upon the left, the snow has yielded place to rock too sheer for snow to rest on, and without a ledge by which a traverse could be made. Then, in the centre, first a single heavy cornice, before the rock becomes too steep for snow, and, further on, a spectacle that I had never seen or read of previously, and which is unequalled in the experience of several experts I have since consulted, — a triple cornice, with the central flange reversed, two springing from the bare rock face upon a base but a few inches wide.

Two alternatives alone suggest themselves for overcoming this most formidable barrier. The one, to beat down all the cornices with the ice-axes, — a tremendous job; the other, to tread down a narrow pathway, exactly on the base of each, above the rocky knife-edge, and, balancing without a touch to right or left, prepared for the chance of the entire cornice falling as we pass, gain the further side.

The consultation was not lengthy, for our party was not expert enough for such a feat; so, with a swift survey of the extensive panorama, now including all the northern mountains near the railway along the continental backbone, and many further still, and a final lingering look on Goodsir's yet unconquered summit, scarcely one hundred feet above and three hundred yards away, we clamber down our awkward, rocky wall, creep softly across the treacherous *arête*, and sorrowfully retrace our steps, by cliff and ice-slope, scree and snow, down to our bivouac at four P. M.

Our turn was made at half past ten, when our elevation was estimated (the mean of three aneroids) at about 11,300 feet.

From bivouac to lower camp took but little over an hour, rain falling as we neared our goal, with prospect of a heavy shower and more to follow. So it turned out, and our improvised shelter of branches proved most inadequate against the torrents of a succession of thunderstorms. A huge fire, however, replenished at intervals throughout the night, kept us warm, and we were none the worse.

Morning broke with clouds enveloping the mountain tops and a more than doubtful weather prospect. Long deliberation eventuated in a determination to try Mt. Chancellor next day, going to a high camp as usual in the afternoon, and sending off our horses and paraphernalia to Leancoil.

The day improved as it wore on. Some pictures were obtained, and after dinner we mounted the thickly wooded slopes along the course of a torrent that descends in bold cascades from a high side valley opening from the west just opposite our camp, intending to make the ascent the next day by the long buttress ridge, which strikes the main arête about a mile from Chancellor.

At our usual altitude of about six thousand eight hundred feet, we found a spot in which to spend the night, and, as thunder clouds looked threatening, at once prepared an elaborate nest, hollowed amongst the roots of a large pine, and filled in with small trees and branches. It looked a cosy retreat, and it was wonderfully waterproof; but, alas, when we turned in, we discovered its one weakness. The surface of our quadruple bed was not completely level, and being by mischance at the lower end, I was soon conscious of a great oppression, as Professor Fay, crushed downwards by the ponderous forms of our two heavy-weights, forced me against the barrier of spiky trunks and boughs which closed us in. Hours of expostulation and hilarity, varied by experiments of a serious or jocular nature, which gravity defied and which defied gravity, culminated in an uneasy slumber, from which we rose without much reluctance at an early hour.

The storm of the night before, a grand display of vivid lightning and tremendous thunder, which reverberated almost interminably among the mountains round, had cleared away at sunset and given us an immortal vision of Mt. Goodsir (like a peep into the glories of Paradise), powdered with fresh, sparkling snow alight with crimson flames and circled with soft, clinging wreaths of tenuous cloud, most delicately tinged with tender roseate hues and palest gold.

Now, in the brilliance of a cloudless sky, the sun rose clear and augured well; 4.40 saw us on the move, beginning with a wearisome ascent up slopes of fine sandy débris, which slipped beneath our feet at every step. At half past five we struck the ridge at eight thousand feet, and, during a brief halt to inspect our route, had a delightful view of ten or a dozen mountain goats, browsing and clambering about upon a spur a long way down.

Then up to the main arête, to reach which required the cutting of a breach through the long cornice which extended right across the point of junction. This was about nine thousand feet up. Between us and Mt. Chancellor there lay a long and often narrow ridge, much broken by gendarmes, especially towards the further end, and containing three distinct peaks. It was evident our course must lie practically along the crest of the arête, climbing each intervening point. All went well for some time; the work was interesting if somewhat slow, and here we had struck the igneous outcrop and the syenite was firm and solid, giving good grips and stable footholds. Nevertheless, with snow covering much of the mountain, all traversing had to be extremely cautiously undertaken, and there was much of it, varied by grand gymnastics on the pinnacles; the ridge proved infinitely more serrated than we imagined. The gendarmes multiplied into squads and companies; spires and towers, fifty and sixty feet high, had to be scaled, the summits traversed, and an abrupt descent immediately made. A few yards further another one would rise, and the process be repeated.

Huge cornices hung over frequently upon the eastern side, above the glaciers that yawn with gaping crevasses below, and sometimes there would be a spell of our old enemy, the limestone, so that an almost sheer finger of rock, protruding abruptly from a ridge two to three thousand feet in height, would have to be negotiated with the warning from the ever-watching Häsler. "You must not touch the snow, and that rock" (pointing to the only one which could apparently be used at all) "is not safe!" And all the while these gymnastic performances had to be perpetrated we were loaded with heavy packs.

At length, before an even more perpendicular tower than ever, we faced the situation: several more gendarmes before the last col; a long and difficult scramble on the peak itself, probably a four-hour job for our party; provisions for only two more light repasts; no knowledge how a descent could be effected on the western side; and twelve o'clock. To go on seemed to render inevitable a night upon the mountain, perhaps at a great elevation, and we had no food for another day. So prudence won, and sadly, for the second time that week, we retraced our steps, repulsed.

We made our way back to the top of the last peak surmounted, and after lunch, descended the buttress towards Leancoil; then turned down a long, steep slope of snow into the wide, deep couloir directly south of Chancellor's black pyramid. Down this we hurried till a sudden drop between two splendid precipices compelled us to make a *détour* across several ribs of rotten rock, supporting the base of Chancellor, down gullies full of shifting scree to timber-line, and then still down, plunging through bushes and swamps, and over fallen logs to the Wapta flats opposite Leancoil Station at five P. M.

Here, alas, the river barred our way and was impassable. We sought a boat, but sought in vain; and finally were compelled by force of circumstances to try the trail that we had heard of by the east bank of the Wapta to Ottertail, where the railroad crosses the river. Five miles does not sound a lengthy journey, even to tired men, but the distance is not the only consideration. The trail proved to be of great antiquity: often it was quite obliterated; at best, indistinct, difficult to trace, and constantly blocked. Its devious nature, false turnings, scrambling over fallen tree-trunks, fighting through dense undergrowth, pushing between the dry, sharp fir twigs, manœuvring round muskeags, jumping little streams, hauling logs to cross larger creeks, clambering up cut-banks, *détours* here, and twistings there, made it the worst experience any of us had ever been through.

After two hours we had to stop for the night; on the edge of a swamp, serenaded by crickets and mosquitoes, short of food, we turned our toes up to the sky for the sixth successive night, and tried to sleep. Hopefully we started next morning, although tea and a mouthful or two to eat was all our breakfast, but four more solid hours of hard going took all the exuberance out of us before the bridge by which the Canadian Pacific Railroad crosses to the south side of the river appeared in sight, and as, half in exultation, half in weariness, the cry "The Bridge!" rings out, we wonder if the famous *Θάλαττα! θάλαττα!* of the classic story brought an equal sense of deep relief.

Eight more miles to tramp, and still no breakfast! But we were now upon the railroad track, a smooth and direct route, and spirits rose again. Welcome refreshment again at Mr.

Lindsay's shack sent us on our last five miles to Field in first-rate trim, with six days of interest and enjoyment to look back upon — in spite of disappointments and hardships, one of the finest and most pleasant trips in any of our memories.

Foiled once, we were enabled to conquer the Chancellor before our time expired, though Mt. Goodsir was too distant to attempt again.

A week later, Scattergood, Häslar, and I, with G. M. Weed (A. M. C.), of Boston, were deposited at Leancoil for another attack. Unfortunately, an accident to the Professor's knee (incurred during a reconnaissance of Mt. Biddle that we were making from our camp by Lake O'Hara) prevented his having his revenge upon the mountain. This time we were to try it from the west, and, in order to avoid the awful trail experience, we brought a sackful of spikes, rope, etc., to construct a raft, on whose frail structure we expected to entrust ourselves and all our goods.

None of us had ever made or navigated a raft, but that was a mere detail, although I, for one, had serious doubts whether we could manufacture one fit to hold together in the rapid, turbulent flood of Wapta, or steer it safely once we were embarked. But, fortunately, thanks to Mr. Duchesnay's kind assistance, a boat was discovered and a crossing made in two sections with a portage in the middle.

Thence we headed for the mountain side, traversing the swampy flats and the heavy, log-strewn undergrowth of Chancellor's lower slopes. Bearing to the right, we mounted to nearly seven thousand feet, but found an utter absence of water in the upper gullies, and were obliged to pass still further round the shoulder and descend a few hundred feet before we found a suitable abode. At last we camped on the steep side of a deep gully, with scanty pines scattered along its slopes, an enormous vertical wall behind, cleft by a narrow chasm, down which a torrent pitched in headlong rushes and picturesque cascades. Here we were most comfortable, under the benign influence of a lustrous full moon and clear-shining stars.

Determined to have plenty of time at any rate for this attempt, before three o'clock we were stumbling upwards over fields of sloping scree in the uncertain, fitful moonlight. Day broke ere

long, and as the sun rose, radiant beams lit up successive peaks, and finally the entire long chain of snowy Selkirks was bathed in golden glow.

Two obvious lines of ascent suggest themselves to the mountaineer approaching the Chancellor from this direction: one, the more sporting, right up the steep and jagged ridge, which, broken by occasional vertical cliffs, ascends directly from the west; the other, a more certain route, by the deep snow couloir at the southern base of the west buttress, leading up to the depression just below the towering summit, and thence by the sky-line to the top.

We chose the former, as likely to afford the most exciting climbing, leaving the other to fall back upon in case of need. The lower part was simple, although the rocks were absolutely rotten; then a gully had to be scaled and some ledge work negotiated, up to the base of the first sheer cliff, just beyond the junction of the two foundation ridges. This point is about 8800 feet in altitude, and we arrived at five o'clock.

Some prospecting was necessary here to turn the precipice, and an awkward but apparently feasible way was located on the right side. After a slippery traverse, the initial piece of straight-up climbing was effected by an acrobatic scramble up an overhanging mass of rock, with scarce a crack to get the slightest hold upon. Called to the front, by means of extra length of limb and a slight step made by Häsler's axe, I managed to hoist myself up to the top of this obstacle, and gain, by somewhat easier clambering, a narrow rift from which point of vantage I could with the rope facilitate the arrival of the rest.

Slow, cautious climbing ensued for some little distance; a rock-tower called for a rough scramble, ledges and cracks on slippery slabs had to be traversed; but, finally, from a point unseen by me, Häsler announced that we could go no further by that route, and though I still am strongly of opinion that the ridge might have been gained by a divergent line, time was slipping away so swiftly,—two hours had already been spent on this short bit, and difficulties as great or greater might be met above,—so once again discretion proved the better part, and we slowly made our tedious way down the precipitous face, hastened down the easier rocks and couloirs, till we could find a

way of access by the rocky wall to the snow gorge below. Here we arrived at ten o'clock, at just about an hour and a quarter's distance from our camp, six precious hours spent in the futile but most delightful rock scramble and its approaches.

After a meal, quick progress up the gully ensued and zigzags up the rocks and snow, by any available ledges and miniature couloirs, till soon after noon we stood on the ridge dividing the Wapta and Ice River valleys, just about ten thousand feet above the sea, and two or three hundred yards beyond the point at which we had turned back in our previous attempt. From the col we looked up interestedly at the steeps of the final struggle.

Under good snow conditions this would be a quick and easy matter, and the climb will probably be done some day in less than four hours from timber limit; but on this occasion the snow lay thin over hard and slippery ice, ready to avalanche at any moment, and it was useless to think of trying it. So nothing but the rocks were left; and they were mainly huge slab sections, tilted sharply in the direction of ascent, too slippery to scramble up and therefore necessitating frequent turnings first on one side and then another, passing along cracks and ledges, one so closely overhung by a great rock that a serpentine wriggle alone could bring us through the gap. Clefts, sometimes lined with ice and graced with trickling waterfalls, had to be ascended vertically, huge rocks were swarmed by dint of close embrace and friction, — an infinite variety of the niceties of a rock climb, an amusing series of interesting and effective situations.

But it all took time, and only at three o'clock did we stand at last, after our third attempt, upon the summit, 10,400 feet in elevation. The peak is double, that towards the west crowned by a massive cornice. The day was exquisite, clear but with a lovely sky, massed with effective clouds. The view was consequently at its best, and it is most magnificent.

The noblest features, from which the eye can scarcely wander, are the gleaming glacial heights of Vaux and the huge triple mass of Goodsir, one of those mountains which exert a fascination indescribable and inexplicable. But when we could look beyond, what a sea of alpine crests spread round us, reaching to



MT. WASHINGTON FROM MT. CLINTON (FEBRUARY, 1891).

From photograph by Charles E. Lord.

the horizon, range on range: the Selkirks, always glorious in their whiteness and ethereally bright; the mighty monarchs of the north, untrodden, almost unexplored and practically still unknown; and the familiar forms of the great peaks of the continental watershed, Stephen and the Cathedral, Hector and Balfour, Habel and Collie, Victoria and Lefroy, Hungabee and Deltaform, with the grand ice-clad helmet of Mt. Temple shining resplendently above the line of giants, behind which its massive form conspicuously towers.

Our observations and photography occupied us fully; but Häslér's urgent calls had to be heeded, and all too soon; at 4.15 we turned to ordinary earth once more.

Descending to the col was nearly as slow a process as the ascent, and ere we reached the unbroken snows at its base, the setting sun had flooded all the pure slopes around us with its rich crimson, dying glow, which faded to the cold and weirdly bluish hue of snow that waits the fall of night.

Huge strides and numerous glissades were welcome after ropes and caution, but darkness gathered rapidly as we came down the last loose slopes of débris and tumbled into camp at nine o'clock, just eighteen hours after leaving it.

A good night, a quick run down the canyon bed next morning, a more tedious tramp to the river-side, a tumultuous transit in our borrowed boat, and we were at Leachcoil, from whence on "No 2" we later on arrived at Field, well satisfied that on the third appeal we had secured a verdict in our favor from the Chancellor.

Winter Climbing on Mt. Washington and the Presidential Range.

BY HERSCHEL C. PARKER.

ALTHOUGH various magazine articles have been written and a book has been published concerning Mt. Washington in winter, the general public, who know the mountain so well in summer, are not by any means well informed on the subject; for example, some of my friends ask me whether the railroad is running in winter, or whether the hotel is open; while others

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seem to doubt the sanity of any person who has the hardihood to make so perilous a climb. It is hardly necessary to state that both points of view are equally erroneous.

From a mountaineer's standpoint, the winter climb is a very simple and easy piece of alpine work, the danger and difficulty involved bearing no comparison to an alpine ascent of the first class. Under favorable circumstances, however, a winter visit to Mt. Washington, the Northern Peaks, or some of the great ravines, for grand views and exhilarating climbing is excelled by few alpine experiences.

But while there are no dangers on Mt. Washington from crevasses, avalanches, and falling rocks, the terrible storms that sometimes rage about the summit and over the "Great Range" constitute a menace that even the strongest climbers should never face. There is only one safe rule: never visit the summit when it is enveloped in clouds, or the conditions indicate that clouds are likely to descend upon the mountain. In these clouds the temperature is often comparatively high and the velocity of the wind very moderate; but on the other hand they may sometimes mean the most furious storms of flying frost.

The mountaineering outfit required for a winter visit is rather unique: a good strong pair of snow-shoes, the best of ice-creepers (preferably of the pattern recently devised by several members of the Club), and some form of ice-axe or alpenstock. Plenty of warm clothing should always be carried, and some means of completely protecting the face provided, although on many days this precaution is quite unnecessary.

The writer's experiences include eleven winter ascents of Mt. Washington, the first having been made on January 1, 1891, and the last on February 21, 1902. These climbs were made by several different routes, as follows: three times by the carriage road; three times by Tuckerman's Ravine; twice by the railroad; twice by the Northern Peaks; and once by the Crawford path. On five other occasions an altitude of half way or over was attained, after which it was considered wiser to return.

It is not my intention to give a detailed account of all these climbs, but rather a brief description of the more interesting

ones, with some slight mention of the others in their chronological order.

Leaving Gorham on a beautifully clear morning, December 31, 1890, the temperature being about ten degrees below zero, Glen Cottage was reached in time for lunch. From this point to the Half-way House the snow-shoeing up the carriage road was extremely difficult, soft light snow three or four feet deep being encountered. Without any companions to help in "breaking," this work was very fatiguing, and the Half-Way House was not reached until sunset. Here a fairly comfortable, but rather lonely night was passed. The next morning the weather proved dark and threatening, heavy clouds enveloping the upper portion of the mountain. Notwithstanding these ominous conditions, I determined to make a try for the summit, although I felt greatly disappointed that the splendid weather of the previous day had not continued. It may interest friends who have accompanied me on some of my later climbs to know that I had no ice-creepers or alpenstock of any description, that I wore moccasins of the softest and lightest kind, and was further handicapped by wearing an overcoat.

After going a short distance, huge drifts of snow covered the road, and great caution was required in crossing them to prevent a serious slip. At one point, while carrying my snow-shoes under my arm, I fell and, sliding down, left one of my shoes on the snow above me. Here was a very unpleasant situation. I could not keep my footing on the icy snow in order to climb up and reach the shoe, neither could I return through the deep soft snow on the lower portion of the carriage road without it. Luckily I remembered that I had a large pocket knife with me, and by means of this I was able to cut steps in the hardened snow, and so regain the shoe.

No further incident occurred during the remainder of the climb; and the summit, being finally reached, was found enveloped in a thick "frost cloud," the wind blowing probably some fifty miles an hour. After a very brief stay, the return was commenced, and again in crossing the icy drifts the most extreme caution was found necessary to prevent a slip. In the course of time the Half-way House was reached, and from here the return to Glen Cottage was only a matter of a four-mile snow-shoe walk.

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My next winter visit to the mountain was made February 20, 1894. In company with Mr. W. B. Abbott, I again tried the carriage road; but a fierce storm of wind and snow was encountered at the Half-way House, and after waiting two hours for an improvement in the weather we decided to give up the attempt. On our return to the valley we found the weather fine and mild. This illustrates the conditions which often prevail during the winter months. If the summit is enveloped in clouds the severest of storms may be raging there, while just below this cloud-zone and in the valleys the air is perfectly still and the temperature high.

Two days later I made the summit easily *via* the railroad in beautifully clear weather.

The railroad is by all means the most accessible route to the summit in winter, and the beauty of the views, and the fine frost work sometimes found, render it a most satisfactory trip. The descent is extremely easy, the average time required being only about an hour and a half.

One of the chief attractions of the Great Range in winter is, of course, the opportunity for real alpine work, and it seemed to me that a very interesting climb could be made *via* Tucker-man's Ravine.

On the 26th of December, 1894, in company with Dr. R. C. Larrabee, and a college friend, Mr. Andrews of New York, I made my first attempt on the mountain by this route. We had expected to find only wind-packed snow, and so I had neglected to bring my ice-axe. We each had, however, long poles furnished with a spike, and Mr. Andrews carried a small hatchet.

We found the head-wall covered with hard snow and gleaming ice, and so were forced to bear off considerably to the right of the direction taken by the path. About two thirds of the way up our further progress was barred by icy ledges, and we spent a "bad quarter of an hour" deciding what should be done next. To return seemed only less dangerous than to proceed, for the small nicks which had been cut in lieu of steps were so few and far between that they had been negotiated by the writer only with the greatest difficulty. The temperature of four degrees below zero, however, forced on us the con-

clusion that a move of some sort must soon be made, and so reluctantly we commenced the descent. This was accomplished more easily than had been anticipated, and the floor of the ravine was reached without accident. Had we been equipped with ice-axes and the improved form of ice-creepers already mentioned, the ascent could probably have been made without much difficulty or danger.

A few days later we attempted the carriage road, but bad weather forced us to retreat at the fifth mile-post.

Chagrined at the failure of my first try at Tuckerman's, I returned to the attack on February 27, 1895. This time I carried my ice-axe, but was not fortunate enough to persuade any companion to accompany me. Leaving "Darby Field Cottage" at 6.40 A. M., the floor of the ravine was reached at 10.30. The conditions since the previous December had entirely changed. The ravine was filled in with snow to a great depth, and the ice of the head-wall was completely covered by a huge mass of wind-packed snow. The first portion of the ascent was made with comparative ease, but near the top of the head-wall the snow became so soft that great platforms had to be leveled off in order to gain sufficient supporting surface to prevent the danger of precipitating an avalanche to the floor of the ravine. At last, however, at 1.30, the head-wall was scaled, and the long climb up the cone commenced. Here another difficulty was encountered; the snow being very hard and icy, a great amount of step-cutting was necessary, and so it was not until 4.50 that the summit was reached. This made a total time of ten hours' continuous climbing from the base, and for much of the time the work was of the most arduous and difficult description. The summit was found enveloped in a thick cloud, and much frost work was observed. A strong wind was blowing, but fortunately the temperature was moderate, the thermometer indicating sixteen degrees above zero. A quick descent by the railroad was made, and the base reached at 6.35. Here supper was taken with the watchman who stays at the Marshfield House during the winter to look after the property of the Mt. Washington Railroad Company, and, after a long dark walk, Fabyan's was finally reached at midnight.

On December 23, 1895, the writer, accompanied by Dr. Lar-

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rabee, again made the climb *via* Tuckerman's Ravine. There was very little snow, and the day was bright and warm. In fact, the heat of the sun was sufficient to detach considerable masses of ice from the head-wall, which came sliding down over the route of ascent. Watching for a favorable opportunity, we made our way as rapidly as possible across the danger zone, and a few minutes later saw the path we had taken swept by falling ice. With this exception, we encountered no difficulty, and made the ascent with the greatest ease.

A few days later we left the Madison Hut, where we had spent the previous night, at 8.15 A. M., and, crossing the summits of Mts. Adams, Jefferson, and Clay, arrived at the summit of Washington about one o'clock. The weather was fine and clear, with a temperature on the summit of twenty degrees above zero. On this portion of the walk we were accompanied by two other companions, whom we had met at the Ravine House. After a half hour's stay on the summit, our friends started down the carriage road, while Dr. Larrabee and I proceeded down the Crawford path. This side of the mountain we found extremely icy, and it was with the greatest difficulty that we finally succeeded in descending the cone, without taking what might have proved a most dangerous glissade. In many places the path was covered with ice, and our progress was not as rapid as it might otherwise have been. Darkness overtook us descending Mt. Clinton; but luckily the moon soon rose, and by its aid we arrived at Crawford Cottage at 7.25. This was, perhaps, the first time that a complete traverse of the Great Range had been made in winter.

The writer's next visit to the summit was made on February 26, 1896, *via* the railroad. The weather conditions were perfect, there being no wind whatever, and the air was brilliantly clear. The thermometer at Fabyan's in the morning registered twenty-six degrees below zero and on the summit nine degrees above zero.

Again, on December 31 of the same year, the climb was made by way of Tuckerman's Ravine, in company with Dr. Larrabee and Professor Little. The original start had been made for Huntington's Ravine, but the fine weather caused us to change our plans on the way, and so Tuckerman's was not



WINTER VIEWS ON THE PRESIDENTIAL RANGE.

- 1— TIP-TOP HOUSE. 2— FROSTED FOREST, MT. CLINTON. 3— ON THE RAILWAY.
From photographs by H. C. Parker.

reached until late in the afternoon. It was just after sunset that we arrived at the summit, and the return was made by a starlight stroll down the carriage road.

The writer had no more winter experiences on Mt. Washington until February, 1899. On the twenty-fourth the head-wall of Tuckerman's was again climbed. The ravine at this time was filled with fine wind-packed snow, and the ascent presented no difficulty whatever. It had been previously arranged with several companions to make the summit and descend by the railroad. When, however, the floor of the ravine was reached, the weather was so cold and the wind above on the mountain blew with such violence, that it was not thought wise to carry out the plan, and so some of the party left their snow-shoes below. Above the head-wall a long wait was made for one of the party to return for his snow-shoes, and finally as he did not appear, the extreme cold made it imperative to return. Nearly all the members of the party on this trip were frost-bitten to some slight extent.

The next day another attempt was made by the carriage road. The strong wind and great cold, however, led the party to make a retreat at the fifth mile-post.

On the following day the writer, accompanied by Mr. Holmes, again started up the carriage road. At the Half-way House the air was perfectly still and warm, but the clouds became dark and threatening. At about the sixth mile-post snow commenced to fall, and from the seventh mile-post to the summit it was a desperate struggle against the terrible wind and flying cloud and snow. Almost blinded by the stinging frost and exhausted by the fierce wind, we had just strength to reach the summit and enter the stage office. Here a most uncomfortable night was spent. The wind blew with hurricane force, the chains pounded like sledge-hammers against the roof, and at times the building, quivering in every timber, seemed about to be blown to pieces. In the morning, the force of the wind having slightly moderated, we decided it would be best to leave the summit as soon as possible, and a safe descent was made by the railroad. As soon as we got below the cloud the air was perfectly still and warm, with no indication of the terrible storm that was raging just above. On this occasion we certainly had

26 WINTER CLIMBING ON THE PRESIDENTIAL RANGE.

a rather narrow escape, but there was absolutely no excuse for our making the climb under the existing conditions.

Again on February 21, 1900, I visited the summit by way of the carriage road. There were some six or eight in the party, but on account of the icy condition of the snow slopes we encountered, and not being equipped with very efficient ice-creepers, some of us considered it safer and easier to return by the railroad.

There remained one route of ascent by which, so far as I could learn, Mt. Washington had never been climbed during the winter months. This was the Crawford path. It had seemed to me the most dangerous way, not only on account of its great length, but also because there is no practical way by which a descent to the valley can be made along its entire extent. The splendid views of Mt. Washington to be obtained on this route, however, appeared to me to render the trip a very desirable one, and finally I decided to make the attempt.

On the nineteenth of February, 1901, a party of us spent the day in "breaking" a snow-shoe path up Mt. Clinton. The snow was of such great depth that often the path was completely lost, and following a false lead we would finally be compelled to retrace our steps, further progress being barred by the huge masses of snow banked against the trees, thus forming a cul-de-sac. These snow effects were extremely beautiful, and the day was really one of pleasure.

Leaving Crawford Cottage about seven A. M. on the twenty-second, the summit of Mt. Clinton was reached without difficulty. The party numbered four members: Messrs. Whipple, Newhall, Haskell, and the writer. It was found possible to continue on snow-shoes to the summit of Mt. Pleasant, but soon after leaving here it was considered advisable to put on the ice-creepers, which were worn the remainder of the distance. The early morning was beautifully clear, and the temperature being eight degrees below zero, the indications gave promise of the finest weather. About the time Mt. Pleasant was reached, however, a dark cloud appeared to the south, and soon the summit of Mt. Washington was veiled by light clouds. From this time on I fully realized that our position would be exceedingly dangerous should the weather conditions rapidly grow worse,

as seemed more than likely, and tried to impress on my companions that we should make all the haste possible under the circumstances. The greatest difficulty we encountered was due to the fact that the icy crust over the surface of the snow would often give way beneath our weight, and so we had continually to exert the greatest care not to receive a serious fall from this cause. This sort of work, besides being terribly exhausting, consumed much time. Where the path traverses the side of Mt. Monroe the snow was banked at so steep an angle that we were forced to cross the very top of the peak. Then came the final arduous climb up the cone, and at last the summit was reached at 2.30. During our stay, the summit remained cloud-covered, the temperature being some one or two degrees below zero. Here we had the pleasure of meeting two friends who had come up by way of the railroad, and two others who had made the climb through Tuckerman's. After an hour and a half for rest and refreshment, we all descended by the carriage road and were driven out to Jackson.

I have already stated that my first trip over the Northern Peaks had been made in December, and as at that time there was very little snow, I desired to repeat the experience in late February, when these fine peaks should be at their best.

In company with Mr. Fred B. Maynard I left the Ravine House at 6.15 on the morning of February 21, 1902, and arrived at the Madison Hut about ten A. M. We were aided thus far by Mr. Brown, of Randolph, who did most efficient work in helping us with the "breaking." The snow was exceedingly soft and the snow-shoeing correspondingly difficult. A second breakfast with the luxury of hot coffee was here partaken of, and at 11.30, bidding good-by to Brown, we started for the summit of Adams, which was reached at 12.15. At the Hut we had put on ice-creepers, and with our ice-axes we were able to travel with ease and safety over the steep, hard snow slopes. We made the summit of Jefferson at 1.15, Clay at 2.40, and Washington at 3.25.

This walk over the Northern Peaks is by far the most alpine trip I have taken outside of true alpine summits. The views are splendid, and superb slopes of hardened snow sweep from the sides of the peaks clear to the floor of the ravines. There

are some places where a slip should not be made, but with ordinary care and the proper equipment, such as the A. M. C. pattern of ice-creepers and a good ice-axe, there is but little real danger in fine weather.

We had intended, if possible, to continue the trip down the Crawford path, but on account of the lateness of our arrival at the summit, and the weather then being cloudy and threatening, we made the descent by way of the railroad. At the Marshfield House, where supper was taken, we were unexpectedly joined by three of our friends who had come over the summit by way of Tuckerman's Ravine, and the united party then continued on to Fabyan's.

In conclusion I may add that since the winter climbs on Mt. Washington are of an alpine nature, only those persons fitted for alpine work should undertake them. The matter of equipment always deserves careful consideration, and good judgment and caution must be exercised at all times. In all the winter climbing on Mt. Washington and the Presidential range, there have been no accidents, and in future, climbers should not only consider their own safety, but determine that this record shall remain unbroken.

At the Western Sources of the Athabasca River.

BY JEAN HABEL.

THE main range of the Rocky Mountains, north of the Canadian Pacific Railway, is bordered to the east by a succession of longitudinal valleys, running about southeast to northwest, and separated by two passes: the "Bow Pass" (6800 feet), between the Bow River and the Little Fork of the Saskatchewan, or Bear Creek, and "Wilcox Pass" (7800 feet), between the north fork of the Saskatchewan and the eastern branch of the Athabasca or Sun Wapta. These valleys seem to offer the shortest and most convenient route towards the north, to Fortress Lake and its nearly unknown environs, and eventually to the Committee's Punch Bowl on the Athabasca Pass. They are very seldom visited, as there is nothing which could induce a man to enter them, excepting the magnificent mountain scenery, the

hitherto untrodden peaks, and the charm of investigation, or perhaps a few wild animals. Their description has been given by Hector, Coleman, Wilcox, Collie, and Thompson.¹

In the summer of 1901 I followed this route with the intention of exploring the unknown region south of Fortress Lake. Not very much was achieved, for, like all former expeditions, mine ran short of provisions, and we had to return a fortnight earlier than I had anticipated, just when we had found the right way to advance on difficult ground, and in perfect weather.

I left Laggan on July 2, with two packers, a cook, four saddle and eight pack horses. The weather was alternately rainy and fine. The most wonderful scenery of the two Waterfowl lakes, bordered on their western side by precipitous, glacier-clad mountain walls, by Howse Peak and Pyramid Peak, I enjoyed on a cloudless day. On July 9, after having camped west of Bear Creek, we crossed the Saskatchewan to its left side, a little to the east of the confluence of its north and middle forks, without difficulty; although we had to swim one of the branches, into which the river divides. My personal outfit had been put into waterproof bags, with the exception of a small trunk, the contents of which I had the pleasure of drying in our camp (VII. XXXIII. 4630 feet)² above the northern shore of the river.

From the Saskatchewan to Wilcox Pass we had to camp four times. Following the left bank of the North Fork, through burnt timber, which needed much cutting, later on an old trail, through dense forest of spruces, pines, willows and poplars, the

¹ Dr. Hector in *Exploration in British North America. Journals, detailed Reports, etc., relative to the Exploration by Captain Palliser 1857-60*. Presented to both Houses of Parliament, London, 1863. Printed by G. E. Eyre & W. Spottiswoode. Index and Maps separate. (Out of print.)

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Charles S. Thompson: "A New Pass at the Head of the West Branch of the Saskatchewan River." *Appalachia*, vol. ix. p. 372f.

² The Roman numerals mark our camps; two numbers indicate that we camped twice on the same spot, on our way north as well as on our return.

ground enlivened by a rich vegetation in full blossom, we reached our camp (VIII. 4850 feet) at the foot of Mt. Wilson, in five hours. Next day a thunderstorm kept us back in camp till eleven o'clock, and forced us on the road to seek shelter in a grove of spruce for some time, as it was impossible to steer the horses against the furious wind and the whipping rain. We followed the river-flat, crossed to the right¹ shore above the mouth of the West Branch, and camped there on a hill above a small pond (IX. XXXIII. 4890 feet), after a short ride of three hours. Here the trail for more than an hour became well blazed, and the different branches of the North Fork easily fordable. We camped near the river (X. 4970 feet), after having lost the trail in the wood, and having retraced our steps for a short distance. The scenery between here and the camp south of Wilcox Pass was very fine indeed.

After a ride of two hours and a half the river flat was bordered on both sides by steep rock-walls, not so grand and striking, yet similar to the Via Mala, through which the famous roads of the Splügen and the San Bernardino lead from the Grisons over to the Italian lakes. Forty-five minutes later we left the river and ascended for an hour the left mountain slope, on a good trail, and through an open park scenery, with fine retrospects down the valley of the North Fork, as far as Mt. Sarbach on the main stream of the Saskatchewan, and even to the mountains beyond it. Then we looked down into the canyon, through which the river descends in a fine fall, and after a little more than five hours' ride dismounted in the shadow of venerable spruce-trees and camped there close to the steep river-bank (XI. XXXI. 6190 feet), about two hundred yards this side of a broad avalanche path, on which the remains of the last slide still lay straggling in a long line down to the creek. Here the valley forks, the right branch leading to Wilcox Pass.

We were detained here a day by rain. On July 15, in fine weather we crossed the pass (7800 feet). There was still much snow on it, which our horses had to traverse. The glacier-clad mountains to the south and southwest, Mt. Athabasca, the Dome, Mt. Douglas, the broad and rocky, nearly level bottom of the high valley, over which the pass leads, in the foreground the

¹ Right and left are always employed in the geographical sense of the words.

snowfields, with our horses in a long file on them, made quite a picture; — one could fancy he was in High Asia, on a pass leading into Tibet. On our return, when we crossed the pass on another beautiful day, August 17, the snow had nearly gone. On that day we had another strange view. A forest-fire was raging in the valley of the North Fork of the Saskatchewan. An enormous cloud of dark yellow smoke rose perpendicular towards the cloudless sky. We seemed to be looking at the eruption of a newly started volcano; — a very exciting view for us, as we were to pass the place twenty-four hours later.

It took us seven hours to cross the pass and five hours to re-cross it. Soon after passing the above-mentioned snowslide Mt. Athabasca becomes visible. The depression at its base, divided by a hardly perceptible watershed, is barred towards the Athabasca by two glaciers; the descent is impossible for horses. At the end of the swampy valley (6800 feet), which drains to the Saskatchewan, we turned to the right and climbed the steep wooded slope to the higher parallel valley, which, flanked at the northwestern end of the pass by the northern rocky slope of Peak Wilcox, plunges abruptly down for about five hundred feet to the tree-line. Here we camped (XII. XXX. 7130 feet) at the head of the valley leading down to that of the Sun Wapta, over which a glacier-clad mountain range with two peaks of Mt. Stutfield, a portion of Mt. Alberta to the right of them, Mt. Woolley and Diadem Peak are visible.

The next morning we made the mistake of crossing to the right side of the rivulet of this side valley, and, after great difficulties and many ups and downs, reached the shingle flat of the river-bed of the Sun Wapta in about three hours. One should remain on its left side, as we did on our way back. We followed the river-bed for another three hours, and camped (XIII. XXIX. 5345 feet) on the left bank on dry ground after having passed a tract of swampy meadows with difficulty. From our camp two prominent mountains were visible towards Wilcox Pass, over the broad sheet of water into which the river here expands; the one to the southeast marked 10,000 on Collie's map, — let us call it Mount Sakkarah, after the pyramid of Sakkarah in Egypt, — and to the right of it the flat-topped Mt. Douglas. To the west we looked into a smaller side valley in

which Diadem Peak was visible, to the northwest down the valley of the Sun Wapta, bordered on its left side by gently inclined, forest-clad mountain slopes, on its right by a steeper, nearly treeless rocky ridge.

Following the left bank of the river, we arrived, in an hour and after having passed a creek, at a swamp, which made us cross over to the right side. After one hour and a quarter we passed Jonas Creek, and arrived in forty-five minutes at the big rockslide, which Coleman mentions in his report. For an hour and a half we tried in vain to find a road through this chaos of gigantic boulders, which the force of the fall had carried entirely over to the other side of the river; so we crossed back to the left bank, where we camped half an hour later opposite Pobokten valley, with Mt. Sakkarah still in view (XIV. XXVIII. 5015 feet). At this camp our horses were nearly driven mad by the horseflies, the so-called "bulldogs." We built a big fire, in the smoke of which they found relief from this maddening plague.

We followed again the left bank of the river, close to the water's edge, where some of the horses tumbled into holes, but were always luckily rescued just before rolling over into the swift-flowing river. After a ride of five hours and a half, we camped on not very favorable ground (XV. 4720 feet) not far from the end of the ridge which separates the eastern Athabasca or Sun Wapta from the western Athabasca, and the next day advanced only for two hours, camping near a little lake (XVI. XXVII. 4600 feet), northwest from the above-mentioned ridge-end. Here the fallen trees were so numerous that it was quite impossible to advance without cutting a trail, which was done in the afternoon. On this trail we reached the western branch of the Athabasca in one hour and a quarter, and made the mistake of crossing it. The horses lost their footing and had to swim, so that on the left bank, amongst fallen burnt timber (XVII. 4300 feet), we had once more the pleasure of drying ourselves, our provisions, and our clothing.

The road on this side of the river was tolerably good for about two hours, then we had to ford the different branches to the right side. After two hours more, an impetuous mountain creek and fallen timber forced us to a détour up-hill. Just



THE BLACK FRIARS, FROM FORTRESS LAKE.

From a photograph by Jean Mabot.

above its confluence with the Chaba River we forded the western branch of the Athabasca again without difficulty, and after seven hours' ride camped between the rivers, on the plain covered with small pebbles and some vegetation (XVIII. XXI. 4360 feet). From here we looked straight up the Chaba valley. Not far from us to our right stood Fortress Mountain, on the opposite foot of which lies the lake of the same name. In the background a long glacier-clad mountain ridge was visible—the Coleman range—sending a glacier of the first order down into the valley. Opposite to the situation of Fortress Lake appeared the ice-topped massif and pinnacles of a mountain, which I have called the "Black Friars," after the "Schwarze Mönche" in the Bernese Oberland.

The latter mountain presented most beautiful views on our two hours' ride to Fortress Lake, where we camped (XIX. 4360 feet) from July 22 till 28. There is no good camping-place near the lake, the soil being very damp, but the scenery is very fine. Over the wooded slopes of the northern shore rose the bastions of Fortress Mountain. This mountain was climbed by Barrett, the partner of Wilcox, who gives it a height of 9600 feet; he had no view on the summit. The side valley west of the mountain seems to lead into the vast region north of the lake and Wood River. As I saw later, this region is filled with glacier peaks higher than Fortress Mountain. On the southern shore of the lake there opens a side valley, to the west of a peak lying opposite to Fortress Mountain, and of nearly the same height. This valley perhaps affords access to the high mountains west of the western Chaba valley. To the east rise the rugged pinnacles of the Black Friars, and nearly due west stands a very prominent snowy mountain, visible nearly from top to bottom, in shape similar to Mont Blanc. We had very bad weather at Fortress Lake, and on the day I intended to measure the mountain it was constantly hidden in clouds. It appears higher than 10,500 feet, the height given by Wilcox.

I spent two days in reconnoitring the Chaba valley. This valley forks (4900 feet) after about two hours' ride from Fortress Lake. We forded the two branches and soon got to the narrow entrance of the western valley, barred by a huge avalanche. Here we had to leave the horses. Following the steep

bank of the river, and crossing it by the wreckage of the avalanche, after an hour's tiresome walk we reached the valley glacier (4760 feet), which ends in a broad *débris*-covered tongue, on the eastern side of which the river emerges through a wide ice-gate, open on both sides, so that behind it other parts of the glacier are visible. A hanging glacier descends in a southwestern side valley, and behind the valley glacier, in the south, rises the Coleman range. It would not, perhaps, be difficult to penetrate through the latter to the high peak, which, as I saw later, stands more or less remotely beyond; but it would be a serious undertaking to get the necessary outfit into the valley, and south of the lake there is feed only on inclined slopes, where the horses would not stay.

In the eastern Chaba valley the conditions proved to be much more favorable. So, after having spent by the lake a last very wet day, in which we had to stick to our tents, as it was hardly possible to move about in the pouring rain and on the now perfectly soaked soil, we left it on Sunday morning, July 28, just as the clouds cleared away for a moment from the top of the Mont Blanc on Fortress Lake. The eastern Chaba river flows through a canyon, fifteen minutes before its confluence with the western branch. Here we had to lead the horses uphill, through dense brushwood and timber, over a rockslide, down to the river again, which we reached after one hour's difficult march, and then easily crossed. Another hour's ride brought us to the end of the big glacier, which descends into the expanding valley. Near the terminal moraines of the former we camped (XX. 4975 feet) from July 28 till August 3, in a delightful situation and under circumstances in every respect most favorable. In the background of the valley the icy dome of a mountain is visible, which I have called Mt. Chaba (10,300 feet), and to the right of it, seen from a point a little further to the north on the true lateral moraine of the glacier, appears a higher, precipitous peak, for which I suggest the name "Mount Eden" (10,660 feet), and for the big glacier, which closes the eastern Chaba valley, "Eden Glacier." From a point on the northern side of the valley, 2790 feet above our camp (7765 feet above sea-level), I had surveyed and photographed the environs. What I had seen from there and from other points

of the higher parts of the Eden Glacier, leading into the basin above it and to Mt. Eden, was very discouraging; even the lower parts appeared to be very much crevassed, and the crossing of it would be difficult, or at least tiresome.

To solve the topographical questions, however, it was necessary to penetrate as far and as high as possible into the glacier region, and for that purpose I left the camp on July 31, at 6 A. M., with two men. We followed the right lateral moraine, and soon after passing a side stream took to the ice, where the crevasses forced us to great détours. It had been my intention to ascend Mt. Chaba, but when the view developed and we entered the very extensive and grand glacier cirque behind the tongue of the ice-stream, hemmed in by precipitous rock-walls, my sanguine companions were of the opinion that we might as well climb Mt. Eden. Although I saw that there was but little chance of finding at once the right way through the labyrinth of crevasses intersecting that part of the glacier, I gave in, and we steered for the latter mountain. After two hours and forty minutes' walk over the "dry" ice-field we roped, as the glacier and its crevasses now became covered with snow. Here we advanced very rapidly along the huge buttresses in which the glacier descends, like the one from the Gran Paradiso (13,325 feet), in the Italian Alps, down to the Cogne valley. Suddenly, at eleven o'clock we stood before a broad and deep schrund, flanked on both sides by an unpassable chaos of greater and lesser crevasses and séracs. The only feasible way would have led through the schrund, a rather dangerous undertaking, as its opposite edge was studded with pieces of ice, which threatened to fall down upon the intruder, and both sides were pretty steep. So, after several frustrated attempts to find another way, and after a good lunch, we retraced our steps at midday, keeping this time more to the left side of the glacier, and descending from it on the same side, close to the camp, to which we had to be carried over through the creek by two of our horses.

Next morning we started soon after four o'clock, crossed the creek on horseback, and followed the same route as the afternoon before. After three hours we left the Eden glacier, climbed the big moraines which separate it from a right side glacier sloping down from Mt. Chaba, — the Chaba glacier, — and roped up

on the latter forty minutes later. Only once did the glacier offer any difficulty, and we feared we were cut off again, but turning to the right we passed the place safely. From the depression between Mt. Eden and Mt. Chaba (9245 feet) we turned to the left, up to the southwestern slope of the latter. For a short time we had to take to a narrow ledge on the other — the southeastern — steep flank of the mountain. "A man may break his neck here," suggested one of my companions, and I knew at once that we had attained the climax of our art. The mountain consists of slate.

At 11.40 we stood on its summit (10,300 feet), on a glorious, cloudless day. I was quite bewildered, — hardly a single acquaintance amongst hundreds of mountains. In vain I looked for a peak rising above its neighbors, which could be Mt. Columbia. The mountains standing near the spot where according to the map it had to be looked for, appeared all equally high, extremely massive, flat-topped, glacier-clad, surrounding a big ice stream which probably descended into the Athabasca valley, of which very little could be seen. From the ice-fields on the southeastern base of Mt. Chaba another glacier descended into the latter valley. To the left of Mt. Eden the broad, wooded depression of the Bush Valley was visible, and in the same direction stood the apparently highest elevation of the region within our horizon: two mountains in the Selkirk range; the one a long ridge, its flank studded with pinnacles and small towers, like a Gothic cathedral, the other a massive mountain, in shape like the upper part of a mediæval house, the roof snow-clad, the gable black rock. High mountains were also visible to the right of Mt. Eden, one peeping with its summit over a minor neighboring range (Coleman range?) towards the western Chaba valley, three standing between this and Fortress Mountain, and one to the right of the latter towards the north. In the east-southeast, there likewise rose a very high mountain of pyramidal shape, perhaps Howse Peak.

My companions slept soundly for an hour, after which they built a cairn, and I wrote our names on a piece of paper, to be deposited within it. As the men had behaved very well I dubbed them "guides from Banff;" my head man, a very good fellow, suggested, "Put 'Swiss guides.'" But as both had been

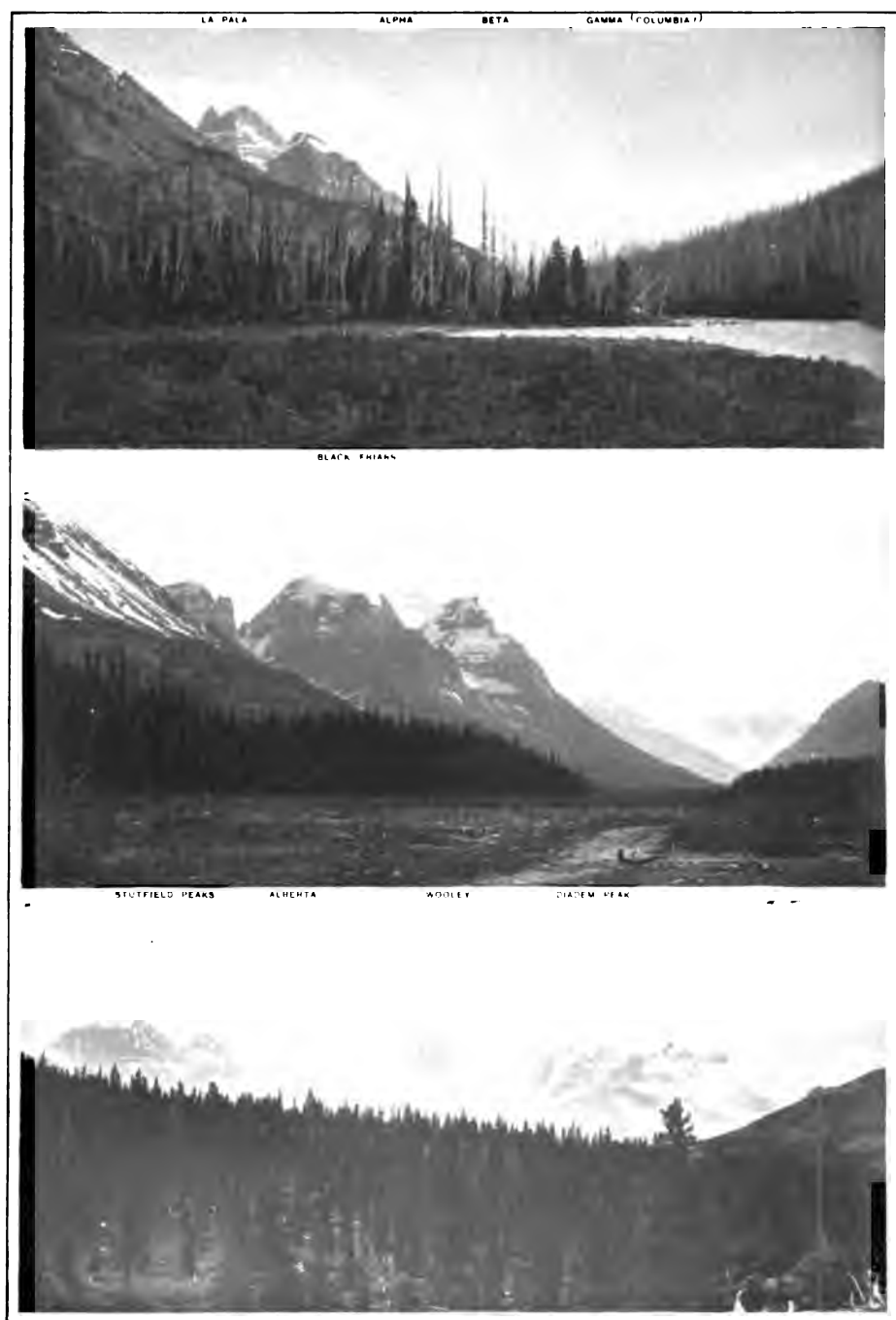


1— MT. ATHABASCA.

2— FORTRESS LAKE.

3 -- MT. DOUGLAS.

From photographs by Jean Habel.



1—THE CHABA VALLEY. 2—UP THE WESTERN ATHABASCA. 3—FROM CAMP XXX.

From photographs by Jean Habel.

born on the plains of America, I thought that such designation would perhaps bring me into conflict with the Swiss government, and abstained from doing so. We remained two hours and twenty minutes on the summit; starting at two, we reached the pass between Mt. Chaba and Mt. Eden at 2.40, the moraines between the two glaciers at four, the camp at seven o'clock.

Most beautiful weather had favored us in the Chaba valley, and I should have liked very much indeed to remain there another week or more, in order to explore other parts of the unknown environs of this "sweet vale," most probably never visited before. But the ascent of Mt. Chaba had not yielded the enlightenment I was looking for, and it was to be hoped that this would be more easily achieved from the western Athabasca valley. So we bade good by to the Eden Glacier on the morning of August 3, and returned in a quick ride of five hours to our camp (XVIII. XXI. 4360 feet) above the confluence of the main stream of the Chaba and the Athabasca's western branch. Crossing the former, I had a very fine view up the western Athabasca valley, and still better from our next camp in the latter (XXII. 4450 feet) which we reached after a difficult ride of more than five hours down its right side, having lost much time in cutting the trail and in getting our horses back from their rambles into the river. Of the four prominent mountains which were visible from our camp, and which stand near the headwaters of the Western Branch, I will venture to call here the northernmost, — one huge massif of rock, apparently quite inaccessible from all sides, — "La Pala," after a well-known mountain in the Tyrolese group of Primiero, and the three following, "Alpha," "Beta," "Gamma," after the first letters of the Greek alphabet.¹

The first hour of the road to our next camp was again very difficult, creeks and muskeags making our horses often sink up to their bellies. Then we were able to follow for three hours the broad bed of the river dividing into different branches, easily crossed till the latter united again and the depth of the water

¹ Professor Collie, who has had the kindness to look at some of my photographs, and to identify thereon the mountains named by him, thinks that "Alpha" and "Beta" may belong to Mt. Alberta, and "Gamma" is probably Mt. Columbia.

forced us to take to the timber. Here we met with new obstacles, so that we had to camp (XXIII. 4560 feet), and to cut our way in advance. Unfortunately our camp was hemmed in by deep creeks, so that it was impossible to move about at leisure and to enjoy the beautiful afternoon and the fine view up the valley.

The next morning at seven o'clock I started alone, covered the newly cut trail through the wood in one hour, and followed the river-flat on a trot, where such was possible over the, somewhat soft soil, advancing very rapidly on my good horse Jenny. Forging without difficulty the different branches into which the river divides again, I arrived in two hours at the still standing poles of a tepee, opposite a right side valley, — Valfredda, — up which three very massive, flat-topped, glacier-clad mountains were visible. The valley widens out here to a great breadth, and an hour later divides into two smaller forks. I followed the right-hand one, and reached at eleven o'clock the broad end of a big valley glacier (4915 feet), which descends into it. Into the left side of this "Western Athabasca Glacier," close to its end, descends another valley glacier from a long trough on the foot of the graceful pyramid, probably Mt. Columbia,¹ and the longer ridge of its western neighbor, which I term here for the better understanding of these lines "Mt. Manitoba." This latter glacier — "Manitoba Glacier" — and the Western Athabasca Glacier, in its western half, are black and covered with debris. The eastern half is snow-white and clear, and apparently easily accessible; not so the high ice-fall in which the glacier descends behind the tongue, but turning to the east perhaps it would be practicable. The part of the terminal moraine where I dismounted was studded with small fir-trees; a solitary chipmunk was the only inhabitant of this lilliputian forest.

After fifty minutes' ride, at half past twelve, I met the "bunch" near the confluence of the two forks. Two of the men were sent ahead with the outfit to look for feed and with orders to camp at the nearest convenient place on the left side of the main valley. With the head packer I rode up the western fork for forty minutes, until I saw that it ended in a steep valley glacier. As I had seen before, another glacier descends into it

¹ Plate I.

from the south, west of "Manitoba." For the mountain between the two glaciers I would propose the name "Mt. Ontario," for the southern glacier "Ontario Glacier," and for the western "Toronto Glacier." Neither glacier descends entirely to the bottom of the valley. We reached camp (XXIV. 4800 feet) at three P. M.

The following morning we rode in one hour to the entrance of the Ontario valley, where we left the horses and ascended its left bank close to the torrent which drains the ice-fields above. Soon the view developed towards the west, above the Toronto Glacier, and Mt. Chaba became visible. So we turned to the right towards Mt. Ontario, to get an open view above tree-line. After two hours' climb we reached a rock (6700 feet) on the flank of the mountain, from which I could survey the environs. The Ontario Glacier has a pretty smooth surface; it would be easy to reach the ice-fields above it, which I presume slope gradually down from Mt. Manitoba and Mt. Columbia (?) If we had had sufficient time, we should have attempted the ascent of these mountains through the Ontario valley. The Toronto Glacier offers a little more difficulty. It is doubtful whether from the ice-fields above, which we skirted on our way to Mt. Chaba, surrounded by Mt. Eden and minor peaks and easy to cross, anything of greater interest could be achieved. Mt. Eden is not accessible from this side. Towards the north, to the right of La Pala, in the side valley at the entrance of which we passed the still standing tepee poles, various peaks and a glacier were visible.

I hoped that by entering this valley — Valfredda — some information about the rather complicated topography of the region between the headwaters of the two branches of the Athabasca might be obtained. So on a rainy day we removed our camp one hour further down (XXV. 4740 feet) to the tepee poles. The next morning we started at four o'clock, followed for one hour and a half an old Indian trail, through dense timber and over many a fallen trunk, then for half an hour alternately by the river-bed and the edge of the forest, and after two hours of very nice gymnastic exercises reached the end of a valley glacier (5610 feet). We ascended the mighty slope of the latter for one hour and a half up to the level part of its tongue (6390

feet). The scenery here became very grand, looking towards the precipitous rock walls which flank the upper part of the ice-stream descending in form of a horseshoe. To how many and to which mountains these walls belonged I could not make out, especially as the day was cloudy. A part must belong to Mt. Alpha. This mountain and all the others to the east of Valfredda are apparently quite inaccessible from this side, and there seems to be no easy pass leading up to the ice-fields further east, as I had anticipated. In the direction of the convex part of the "Horseshoe Glacier," 700 feet above it, the end of another glacier, resting on a precipitous rock wall, was visible.

We had to turn to the left here, climbed a wooded slope in forty minutes, and then rested for half an hour (7100 feet). After having first skirted along an abrupt cliff and then ascended it, we saw that the second glacier is also a side glacier, flanked by the mountains to the east, and that two more glaciers filled the upper part of the valley, descending to about 8270 feet, one from between La Pala and a northern neighbor, — "La Rosetta," — the other from the east and from a rocky ridge, which closes the valley. As the day remained cloudy we steered for the ridge, passed an old glacier-bed, smoothed and paved like a giant's pathway, and crossed the glacier, without roping, to the lowest depression of the ridge (9250 feet). A furious hurricane-like wind was blowing here, so that we had at once to seek shelter behind the rocks. The men declined to go any further in this cold blast, so I tried alone to reach the summit of the ridge, — "Sasso di Valfredda," — and got there (9845 feet) in forty-five minutes, at a quarter past twelve. I looked down into the valley of the Sun Wapta opposite Mt. Sakkarah and towards Wilcox Pass, but the mountains were nearly all veiled. After having made some observations, built a small cairn and deposited my name, I descended to my companions. We retraced our steps, had some difficulty in crossing the creek which drains the Horseshoe Glacier, and arrived in camp at seven P. M.

After another rainy day in the same camp, on which all was prepared for the journey back to civilization, we started in the morning of August 12, on a nearly cloudless day, and returned in a ride of six hours to the confluence of the Athabasca west-

ern branch and the Chaba river, this time camping (XXVI. 4360 feet) on the right side of the united streams, a little below our former camps (XVIII. XXI). From here it took us more than eight hours to reach our camp (XVI. XXVII. 4600 feet) on the little lake. On our way, this time on the right side of the river, without crossing the latter, we had lost about three hours. Once, as the muskeags on the water's edge offered some difficulty, the men cut a trail up-hill for two hours, but had to come down again and follow the river; then five of the horses made a private excursion to a sand-bank, just where the flowing stream was deepest. In the endeavor to get them back the cook nearly lost his life. In crossing the river the forelegs of one of his horses got entangled in the reins. The animal was struggling for his life, and the man had to let it go and swim ashore. Fortunately the horse was carried down to a small sand-bank, and ran aground, with his nose just above the water. The man swam over, cut the reins with his knife, and brought the exhausted animal safely back.

From the little lake we reached our camp in the valley of the Sun Wapta, opposite Pobokten valley (XIV. XXVIII. 5015 feet) in a little less than six hours, passing camp XV. Our next camp (XXIX. XIII. 5345 feet) was reached in a short ride of little more than three hours, the camp below Wilcox Pass (XXX. XII. 7180 feet) in five hours. While we were sitting at supper in the latter camp, a sudden furious gale blew down from the pass, turning over our table-cloth and scattering bacon and beans in all directions. Even the Whymper tent, which had served me for eight years, and had braved many a storm during this time, went down. But this was not the fault of this most ingenious invention, but for lack of properly placing it. After the ropes had been well tied to the ground, it stood like a rock in the roaring storm raging the whole night through, and I slept soundly in it, regardless of the outer world. In the morning the wind subsided, and the weather continued to be fine as before, often cloudless, until we reached the Bow lakes, — in all for ten days.

We crossed Wilcox Pass in five hours to our old camp (XXXI. XI. 6190 feet), and left it early next morning at 5.30, just at dawn, as we had to pass the forest fire, which, as

we had seen, was raging down in the valley of the Saskatchewan. When we reached the scene at eight A. M. it looked very much as if hundreds of camp-fires were burning there on the slopes of the mountains, — in short, as if quite an army of Mr. Tom Wilson's outfits had invaded the valley; and I wondered how long it would take to make this gentleman a millionaire. But here and there these fires were much bigger than ordinary camp-fires, and obviously showed that they were not started for culinary purposes by any of Wilson's cooks. Most probably the fire originated from lightning. As we advanced we saw that many stretches of the timber in the bottom of the valley (in some of which we had lost the trail on our way to the north, and which therefore were quite familiar to us) had been totally destroyed. Not a single sign of the formerly luxuriant vegetation was now visible. We had to steer the horses over gray still smouldering ashes, and through upright standing trunks, smoking like chimneys. Sometimes one of the latter came down with a loud crash. The cook was nearly struck by one of these falling smoke-stacks. Now and then a sharp detonation was heard, as if a pistol-shot had been fired. It was occasioned by the pressure of the vapor and the explosion of the wood. It was no easy task to find a feasible route through these burning ruins. Several times we had to lead the horses back; they seemed to have no idea of the danger to which they were exposed. After two hours, at ten o'clock, we got clear of this infernal place, near one of our former camps, and at half past twelve camped at the entrance of the west branch of the Saskatchewan (XXXII. IX. 4890 feet).

Until beyond Wilcox Pass, the view had been clear, but to the south of the fire it became veiled by the smoke, as is often the case in the latter part of the season, — a circumstance by which the enjoyment of traveling in the Rockies is influenced in a most disagreeable way. In bad weather, there is often a spell which permits to admire the scenery to a certain degree, but the haze caused by forest fires spoils the view in the finest weather often for weeks, and with it all the charm of travelling in those mountains.

From the West Branch we reached the ford at the Saskatchewan in a little more than five hours, and crossed the river in

the same way as on our way north. On August 24 we arrived at Laggan, after an absence of exactly eight weeks.

Our Dash for Mt. Assiniboine.

BY JAMES OUTRAM.

ALTHOUGH a lengthy paper and a series of notes on new climbs already appear under my name in this number, the genial editor has a way with the most obdurate that is irresistible, and I must perforce send a sketch of our expedition to Mt. Assiniboine.

It was indeed a "dash." The usual time for a trip to the south side of the mountain is five days; add the return and only a single day to climb the peak, and, given good weather, eleven days might be expected as the minimum. The southern side is specified, because the latest reports had rated the north face as probably impossible of access, and the other side the only vulnerable one. Two or three days extra for weather had to be allowed, and a fortnight seemed a reasonable period to reckon on.

Two weeks, with the heavy cost of such a long outing, had put the thoughts of trying it out of my head, until Bill Peyto, most experienced and ablest of packers, undertook to take me to the northern base in two days, gave good hopes of reaching the further side in one day more, and assured me that the mountain could be climbed.

So being "out of work" at the end of August, and Peyto ditto, the weather holding fine but dangerously near the break which always comes about that date, a hasty telegram clinched the arrangements, and, thanks to Miss Mollison's enthusiastic and capable coöperation, in a few hours my guides and I were speeding from our comfortable headquarters in the C. P. R. Hotel at Field on the train for Banff, with blankets and provisions for ten days.

We spent the night in our tent beside the Bow River, and after a morning spent in final preparations and making up the packs, at half past one on August 31, our party started off "to do or die."

Peyto and Sinclair, leading and driving the four pack-horses respectively, were as enthusiastic as the mountaineers, and eager to constitute a record on the journey in, and give us every chance of a successful climb. Christian Häslar, of Interlaken, a tried companion of several expeditions, and Christian Bohren, of Grindelwald, Swiss guides stationed by the Canadian Pacific Railway at Field, were my associates in the climbing enterprise, and we followed the cavalcade on foot.

Mt. Assiniboine is about twenty miles distant in an air-line from Banff, but over forty by the nearest practicable route, and some thousands of feet have to be climbed on the way.

The first half-day was spent in traversing the broad Bow valley, with splendid views of Cascade Mountain, Mt. Edith, the Sawback range, and Mt. Massive, to the sharp turn where Healy Creek comes in from the southwest. This tributary valley then became our line of march, and we followed a fairly good trail, steeply at first through trees, till we emerged high above the torrent and passed along more open ground, with many a fallen log across the trail, towards the low Simpson Pass ahead. An interesting valley opened to the south, and our narrowing, well-wooded gorge was picturesquely crowned with rugged crests and castellated ramparts on either side. A heavy thunderstorm broke as the evening settled in, and in the driving rain we hurried on to camp in a pine-thicket about half past six.

Next day we had a long-to-be-remembered journey, with a succession of grand views and interesting scenes from early morn till late at night. First, a narrow ravine, rocky and pine-clad, led us by a rapid ascent to a wide undulating park land, mossy and flower-strewn, with dark groves of trees, and grassy slopes rising to a serrated sky-line; then an upland expanse of flowery dips and ridges, above timber-line, stretching for many a mile along the backbone of the Continent; on either hand, occasional distant views of jagged peaks, and forest valleys beyond deep canyon tributaries. Twice we obtain a distant view of our objective mountain, with a dark range in front, snowy and glacier-hung, a splendid monument of Nature's finest workmanship. Small lakes are nestling in the hollows here and there: one, from the numerous tracks both in and out of it, christened



MT. ASSINIBOINE.

From a photograph by W. D. Wilcox.

by us "The Bears' Bath Tub," from which some ducks flew off at our approach, — almost the only living things seen throughout our expedition in this region, singularly devoid of "life." Next a tremendous down grade into a weird and fire-swept cleft that falls abruptly to the main branch of the Simpson river: the valleys here are boulder-strewn, barren except for abundant raspberries, gooseberries, and blueberries, filled with gaunt, blackened poles, upright or fallen in a network on the uneven valley bed.

A zigzag up three hundred feet of the steep side of an imposing amphitheatre, which, with a sweep of cliffs precipitous in many places, hems in the upper end of the ravine, leads to a scene unutterably bleak and mournful. A black lava fills the centre of a rock-bound basin, dark and forbidding: above it rise gray slopes of débris and a maze of leafless tree trunks, pointing upwards to the splintered pinnacles that loom against the murky, storm-laden clouds. Beyond, we reach a weary valley, strewn with rocks and stones, a few sparse, stunted pines amongst the universal gray, and jagged ridges rising from a desolate stretch of crumbling side-hill.

About six o'clock, across a mountain lakelet, Mt. Assiniboine again appears in sight, about five miles ahead, gloomy, too, in the cloudy sunset hour, but rearing its noble pyramid, lined with its characteristic horizontal cliff-belts and pure slopes of ice, in impressive solitary majesty. An hour and a half later our long journey ends at the shore of Assiniboine Lake, near whose banks we camp in the shelter of a grove of pines, beside a trickling rivulet.

A day and a half for the march in! Peyto's skill and energy had made a wonderful record of his share of the enterprise, and laid the foundation of success. But would the annual snow-storm hold off and reward this feat of rapid marching? It certainly looked scarcely promising. Still, in spite of thunder, clouds, and rain, hope remained high.

Next morning, from our camp at an altitude of about 7200 feet, we were able to inspect the formidable northern face on which the hopes of two of the three previous climbing parties had been quenched. In 1899, Messrs. H. G. Bryant and L. J. Steele had tried a reconnaissance by the northwest arête, but

were obliged to turn back at about 10,000 feet. The next year, the Messrs. Walling, with three Swiss guides, attempted the north face, but were repulsed by the first line of cliffs. The problem appeared to us capable of solution in all probability, but the unanimous opinion of all who had made the circuit of the mountain was in favor of the southwest side as the most feasible, and our aim was primarily the ascent of the peak; so we judged it wiser to leave the problematic, though more interesting, route in favor of the more certain.

At six A. M. Peyto, Häslar, Bohren, and I set off, laden with blankets, a light tent, and two days' provisions; for, knowing little or nothing of the further side and what difficulties it might place in our way, we scarcely expected to do more than find a way round the mountain's base and camp about tree-line on the southwest flank, from whence we should assail the peak on the following day.

Twenty minutes along the flat brought us to snow, and a long hour of steep, hard snow and craggy cliff, with loose, shifting débris above, passed ere we reached the easy sloping glacier that flows along the base of the towering obelisk. We made rapid progress over this to the spur continuing the northwest ridge: then down to another glacier beyond and up to its source at a narrow col, 9600 feet in elevation, at the extremity of the main west arête of Mt. Assiniboine. A halt was made here for fifteen minutes at nine o'clock, while we surveyed the new side of the mountain just revealed. To our great joy we found that we could, without real difficulty, traverse to the southwest ridge, where the climb proper would begin: and there was quite a chance of getting to the summit the same day, had not the clouds, few and fleecy when we started, now become threatening and soon enveloped us.

Hoping that they might pass away as the day wore on, we struck across the ribbed and scored southwest face till we gained the far arête. We "cached" our blankets, tent, and most of the provisions in a rocky hollow, and after a second breakfast, resumed our upward way. Now for a thousand feet or so our route was identical with that of Messrs. Wilcox and Bryant, who with Edouard Feuz, the Glacier House guide, had ascended from the deep valley below by this arête, till, at its head, the

avalanching nature of the snow upon the face, which there has to be traversed, became so dangerous that prudence demanded a retreat about a thousand feet below the summit.

The mists were thick around us, limiting our view to a radius of little more than fifty yards, and a saturating drizzle began to fall steadily. Cliffs, slopes of scree and rocks, appeared before us through the clouds and were successively surmounted, without the least idea what lay beyond. A line of little "way-marks" was erected as a guide on our return, and so we climbed to about 10,750 feet, when we were confronted by an enormous wall, its top lost in the mists, and its face vertical and often overhanging.

Entirely ignorant of the precise location of the peak, Peyto having left us to prospect for minerals, and thinking we had reached a band of cliffs unbroken as on the north side, we sought a way to climb the wall and discovered a small rift which seemed to supply the need, although the lower part was overhanging. Good holds enabled us to clamber up, and a rugged scramble over ledges and up steep gullies and cracks soon brought us to a sharp arête, precipitous on the far side. Imagining this to be the main west ridge, we followed it up till, in about ten minutes, we arrived on a mysterious peak, with a huge precipice along its northern side, the steep and rugged face of our ascent upon the south and sharp, serrated ridges running downward east and west. We were lost. Never having seen a glimpse of this side of the mountain, we had judged the fifth arête, that lay behind towards the south, by the other four which we had seen, and expected the peak to be a tooth, with more or less symmetrical steep ridges trending straight down. Here, however, was a distinct summit. At last reverberations from the westward answered our repeated shouts and indicated where the main mass lay. Then we realized that the southern ridge was longer and less abrupt in its upper portion and must contain a separate minor point, severed from the chief summit by a well-marked gap.

Meanwhile, upon our "Lost Peak," we waited for an hour in the cold and wet, trying to get some glimpse through the clouds, to help us in reconnoitring the approaches to the true summit. We stood a little over 11,000 feet above the sea, and the per-

sistence of the mists convinced us we should get no higher that day; so at 1.35 we started down again, after an hour and ten minutes on the top.

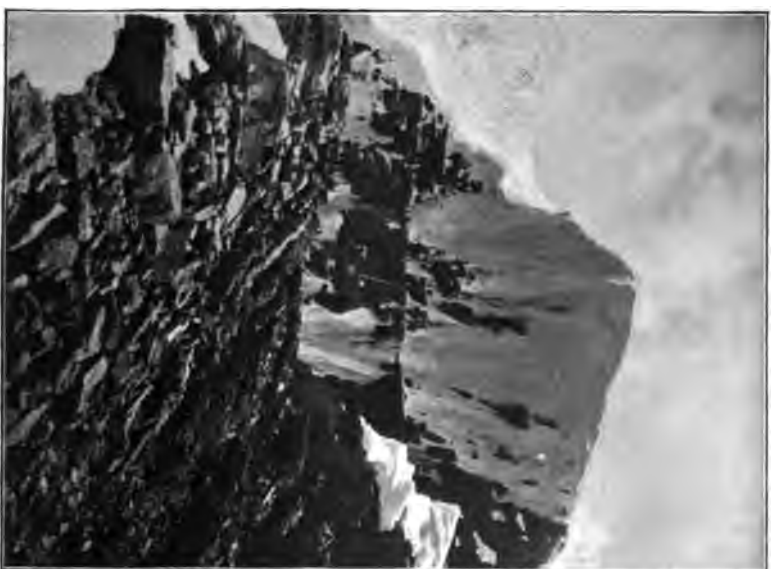
The west ridge ended soon in a sheer drop, — the gap between us and the further main south ridge of Mt. Assiniboine, — how deep we could not see; it later proved to be about two hundred feet. Descending by our ledges and steep crack, we went along the base of the great wall for a few minutes till it trended back and upwards to the afore-mentioned dip, where a great snow couloir divided it from the wide sweep of the main southwest face. The line of attack for next time thus clearly indicated, we retraced our steps by help of our small piles of stones to the "cache," where we had a meal, and finally decided to return to camp with all our impedimenta and make the start afresh from there unloaded, rather than go down to tree-line on the southern side.

It was well after dark when finally, at about 8.15, we stumbled into camp. Reassured by the clearing of the sky and the keen, frosty air, our hopefulness increased, and the early dawn gave promise of a pleasant day.

At 6.10, our trio began the climb which was to be so fraught with interest to us and Mt. Assiniboine, and the date of September 3 is now a marked one in the latter's calendar.

Our way of yesterday was followed to the foot of the big cliff, 10,750 feet up, 3500 feet above the camp, in four hours and a quarter; then, turning to the left, we crossed the snowy couloir and entered on the final thousand feet. The route determined on was roughly diagonally across the southwest face, a series of abrupt escarpments, seamed with narrow shelves of rock or nearly vertical slopes of ice-hard snow. Cracks and small gullies here and there gave means of access to their tops, and then the ledge-work would continue till another cleft appeared. "Verglas" — thin ice upon the rocks — was very troublesome, and all the rock was insecure and needed constant testing; so our rate of progress was not fast, and, with our frequent pauses to locate a practicable line of advance, the next seven hundred feet took us one hundred minutes.

Then, clambering up a narrow, almost perpendicular gully, we gained the southern ridge, and, to our joy, beheld, not more



SUMMIT OF MT. ASSINIBOINE.

1—FROM THE NORTH. 2—FROM THE SOUTH.

From photographs by J. Outram

than three hundred feet above us, the white corniced summit of our goal, reached by an easy slope, and Mt. Assiniboine, we knew, was conquered. Fearing the light clouds that swept around us might increase and spoil the view, only a brief halt was made to gaze about us and to photograph the final portion of the mountain, with its grand eastern precipice.

A quarter of an hour later we stood upon the crest itself, 11,860 feet above the sea, on probably the loftiest spot in Canada where man as yet has set his foot. The double summit is a narrow one, about a hundred and fifty feet long, at the sharp apex of the obelisk, a heavy cornice edging the eastern wall, over whose rim we looked straight down six thousand feet or more. The view is of immense extent; eastward the bounds of the great mountain chain sink suddenly to the wide prairie-lands; on every other side a sea of peaks stretches interminably till lost in distance.

Many an old friend greeted us from the northwest; Mt. Goodsir and the Ottertails, Mt. Stephen and Cathedral, Mts. Victoria, Lefroy and Temple, Hungabee and Deltaform, with many a lesser summit, far and near.

An hour and three quarters quickly sped, and then, in answer to the repeated calling of the guides, I had to leave it all.

On our arrival at the bend, a hundred feet or so below the summit, where the north ridge takes a sudden plunge to the glaciers far beneath, we had looked with curiosity at its jagged outline and the smooth steeps of ice, broken by belts of sheer and overhanging cliffs, that form the northern face, and had decided to attempt to reach our camp by that reputed inaccessible declivity. What difficulties the great rock-bands might present were quite unknown; they might mean a retreat and a night out too high up to be pleasant; but *such* a climb was worth attempting anyway, and we were pretty confident all would be well.

The ridge was like a series of broken wall-ends, with a tremendous precipice on our right hand, and such a tilt upon the left, that for an unroped man to slip meant going to the bottom without any halts. The rocks crumbled and broke away with exasperating monotony; many were "iced," and all so steep, that, whether scrambling down a wall-end, traversing a tiny

ledge upon the face, doing gymnastics in an overhanging cleft, or cutting steps in the hard, slippery ice, caution and skill were every moment in fullest requisition, and almost all the while but one moved at a time.

It took our usually rapid party three and a half hours to climb down 1800 feet, and, after a brief halt below the lowest line of cliffs, an easy snow-slope brought us to continuous rocks, and we unroped. Then swinging down the rocks and getting some glissades further down, we reached the glacier in forty minutes more, and camp less than an hour later, after thirteen and a half hours out.

Next morning we were under snow. The anticipated break had come; but it had waited till our opportunity, secured by Peyto's enterprise and skill in the journey in, and the *one* fine day thus brought within our reach, had been taken full advantage of. And, though the journey back, again in a day and a half, was made in driving snow, we were content with the result.

We reached Banff on the fifth at half past six, just five days and five hours from our departure, and next day were comfortably enjoying a well-earned rest at Field, bearing indelibly upon our memories a pleasant reminiscence of the striking scenes along the route and a well-satisfied remembrance of the splendid climbing and magnificent views afforded us, on that finest peak for mountaineering interest yet known in Canada, the peerless Mount Assiniboine.

The Panorama from Bunker Hill Monument.

BY EDWARD G. CHAMBERLAIN.

BUNKER HILL MONUMENT is perhaps visited by as great a number of different persons as almost any Massachusetts lookout. While making observations there, the writer has given information on request to many people. Most visitors are from a distance and do not stay long. They usually ask the location of Copp's Hill, the landing-place of the British, and the original Bunker Hill. Next the Navy Yard and the modern war vessels

moored there claim attention. "Are the White Mountains visible to-day?" is often asked. Perhaps this Panorama may furnish a permanent answer to these and similar queries, yet only our fellow-members will have the patience to compare it with the view in detail.

This study was begun some thirty years ago, and, as in many similar works, was incited by the misinformation given regarding the view. More than twenty-five years ago the writer called the attention of the custodian to some evident errors in the local guide-book,¹ and was recently amused at finding how easily such mistakes are perpetuated. We are still told therein to look from the *west* window and see "Kearsarge and White Mountains . . . to appearance near each other," the "White Mountains only when the atmosphere is remarkably pure." As these alleged "White Mountains" are really the twin summits of the Pack Monadnock, only fifty-four miles away, we can always see them when we can see Kearsarge, and frequently when the true Monadnock is invisible. All good members of our Club know the White Mountains are about north from Boston. As further instances of traditional error, the most conspicuous island in the harbor, Governor's Island surmounted by Fort Winthrop, is still pointed out as Georges Island with Fort Warren; and (perhaps the most curious slip) we are still asked to see three bridges which ceased to exist nearly thirty years ago. These are the Albany and the Providence railroads "crossing each other," and the Milldam (Beacon Street)!

The work has been prosecuted under difficulties. Constant interruptions, and the deep, narrow windows with their vertical bars, make it almost impracticable to use an instrument of precision; and the city smoke and steam rendered many visits useless on really good observing days. Most of the objects seen were found by patient watching, their azimuths having been computed. Three queries were made in each case. Is the azimuth, or bearing, correct? Is the description accurate? Is there any similar object nearly in line that might be mistaken for it? Some objects seen are omitted, not yet being fully identified; others will probably be found as favorable conditions are encountered.

¹ See APPALACHIA, Vol. IV. p. 141.

The altitude above sea-level, the height of the shaft, the number of stairs, and the orientation of the monument are from my own measurements. The most distant point seen is Mt. Monadnock, sixty-three miles away, properly described in the guide-book as just left of the road over Winter Hill.

The New Refuge on Mount Washington.

REPORT OF THE BUILDING COMMITTEE.

AT the Field Meeting held on Mount Washington in July, 1900, and immediately after the disaster which befell William B. Curtis and Allan F. Ormsbee while on their way to join the Club on the summit, a vote was passed authorizing the President and Councillor of Improvements, as a committee, to raise money and erect a suitable hut of refuge near the Crawford bridle path.

It was hoped that such a safeguard of the life of every person using the Crawford bridle path would interest all frequenters of the mountains, and that the amount needed could be raised at once by popular subscription, the Club simply carrying out the executive details.

A circular was very soon sent to the mountain hotels presenting the proposed plan and asking for contributions, but returns were meagre, and the amount raised was inadequate to warrant proceeding with the work.

On the opening of the year 1901, at the request of the Committee, the newly elected Councillor of Improvements was added to their number.

In the spring an appeal for funds was made to the Club members which met with such a generous response that the Committee was soon able to announce that farther contributions were then unnecessary, though they might be required later.

When the work was nearly completed, these additional funds were asked for, and a prompt response gave the Committee a balance of \$92.06 over all expenses. The money was collected with the understanding that any balance would be used for maintenance of the refuge or similar purposes.

The Committee visited Mt. Washington in June, in order

to select a site for the refuge, and a longer sojourn was made in July, during the construction. On both occasions Hermit Lake Camp was used as headquarters for the Committee, and in July the contractor and his men were accommodated at the Summit House.

It was necessary to choose the location before a design for the refuge could be adopted, as upon the character of the ground would depend, to a great extent, the type of structure and many details of construction. During the preliminary discussion it had been thought that at the foot of the cone a suitable site could be found, partially sheltered from the north and west winds, and accessible by short branch paths from the Crawford bridle path, the Davis trail, and the Tuckerman's Ravine path. Further consideration, however, led the Committee to the conclusion that any point at the foot of the cone would be too near the summit to be of the greatest service to persons coming up the Crawford path. In severe weather such persons would be in danger of giving out before reaching the refuge. It was pointed out that persons coming up by Tuckerman's Ravine have always open to them a safe line of retreat, in case dangerous weather is encountered at the top of the head wall, by retracing their steps down the path, with a comfortable shelter at Hermit Lake in case of need. Very few persons ascend by the Davis trail, and they now have a way of retreat by the Boott Spur trail to Hermit Lake. On the other hand, he who ascends by the Crawford path has, after passing Mt. Pleasant, no safe line of retreat in dangerous weather. The need of a refuge on the Crawford path was so much greater than on the other paths that this path only was considered by the Committee for the shelter.

The problem being thus simplified, several locations suggested themselves. Two points beside the path on the slope of Mt. Monroe were considered — one near the temporary shelter occupied by Curtis and Ormsbee on their ill-fated excursion, the other by a spring nearer the Lakes of the Clouds. Both were rejected. It was thought that persons arriving at a refuge under the protecting wall of Mt. Monroe would not be likely to realize the full force of a storm, and having once passed the refuge would be loath to turn back to it. In the immediate

vicinity of the Curtis monument no suitable site was found, and it was decided to place the refuge on the high plateau, about halfway between the Curtis monument and the junction of the Boott Spur and Davis trails with the Crawford path.

The general locality having been decided upon, the Committee, after careful study of several particular spots, selected the site upon which the refuge now stands. It is directly on the Crawford path, and could hardly be missed even in the worst weather. It is 1580 feet beyond the spot where Curtis fell, and about an equal distance below the junction of the Boott Spur trail. The distance to the summit is about one and a quarter miles. About seventy feet in the rear is a cold spring.

Plans and specifications for a wooden building were drawn, and a contract for the erection of the structure was made with F. L. Temple of Whitefield, who arrived at the summit Monday, July 8, and finished his work July 14. Mr. Temple was the only contractor who was willing to bid on the job.

The refuge is built of wood. All the materials were taken to the summit on the railroad, and carried thence by the contractor and his men to the site. The structure is about ten feet square, ten feet high at the front, and two and a half feet in height at the back. The building faces a little east of south, so that the long slope of the roof is towards the northwest winds. In the front are a narrow door opening inward, and two windows of glass in which wire netting is imbedded. These windows are towards the south, and it is hoped they will admit enough sunlight to keep the interior of the building reasonably dry. One of the windows can be opened. In the gable ends are small ventilators that can be closed with sliding covers inside. These ventilators are protected outside by deep hoods to prevent the entrance of snow and rain. The floor is of two layers of spruce boards nailed to joists, which in turn are supported on sills resting on the stone foundation piers. Between the two layers of boards is a layer of Cabot's sheathing quilt. Above the floor are laid heavy spruce sills, and these are bolted to the foundation by four three-quarter-inch iron bolts, one at each corner of the building. These bolts are set in drill holes in the rock, where they are fixed with Portland cement. Three of the bolts are set in the solid ledge, and the other in a frag-

ment of rock wedged and braced against the ledge by Portland cement masonry.

The walls and roof are of matched spruce boards nailed to spruce studs and rafters. The boards are placed diagonally, and so arranged in combination with the frame as to brace the structure firmly in all directions. Each board is nailed to every timber that it crosses with at least three nails. The walls and roof are covered with one layer of Cabot's sheathing quilt, and a layer of Neponset "black" paper, and are shingled outside with cedar shingles. As it was thought that the sheathing quilt might retain enough moisture to rust out the ordinary wire nails, the shingles were fastened with four-penny galvanized nails, and at the corners of the building and the edges of the roof five-penny nails were used. The shingles were left unpainted, but the door and door-frame and the window frames and sashes are painted black.

Inside, a bed of fir boughs is laid on the floor, divided from the rest of the floor by a cross timber. Without extreme crowding this bunk will hold six persons, and the refuge is provided with six pairs of cheap blankets, hung on rails at the sides. In addition to the accommodations provided by the bunk there is space in other parts of the refuge for storm-bound occupants. Probably, in case of need, twenty-five or more could find shelter inside the building, and yet leave room for a few of the more exhausted ones to lie down.

A pail, a water can, candles and matches, a candle-stick and candle lanterns, and a record book have been placed in the refuge.

Signs have been set up at measured distances of one fourth and one half mile below the refuge, giving the distance to it for the encouragement of weary men, and another sign at the junction of the Boott's Spur and Davis trails indicates that the refuge is one third of a mile below.

It is believed that the structure, built as it is of well seasoned lumber, will resist decay for a long time. It is so carefully framed and braced that it is not likely to be blown to pieces, and it will not be toppled over bodily by the wind unless the anchor bolts should be torn from their hold on the solid rock. Unfortunately no member of the Committee could be present

when the anchor bolts were cemented in place, and for the security of this important detail we must depend on the faithfulness and skill of the contractor, which, however, we have no reason to doubt. In all matters having to do with the strength of the structure, Mr. Temple showed a proper sense of the need of great care; in several details he suggested improvements on the original design, and your Committee is of the opinion that the refuge is in all respects securely constructed.

The Committee desire to extend sincere thanks to the Boston & Maine Railroad for mileage furnished themselves and free transportation of men and freight between Whitefield and base; to the Mount Washington Railway for concessions of the same nature between base and summit; to Messrs. Barron, Merrill and Barron for reduced rates of board at the Summit House for the men employed; to Mr. John Anderson of the Mount Pleasant House for his interest in arranging a benefit entertainment; and to the many cash contributors, who may be classified as follows:—

Guests at Gray's Inn, Jackson	\$2.00
“ “ Summit House, Mt. Washington	5.50
“ “ Perkins Cottage, Jackson	6.00
Fresh Air Club, New York	25.00
National Publishing Co., Boston	25.00
Guests at Mt. Pleasant House	40.25
“ “ Crawford House	50.00
Ten persons, not club members	52.00
Sixty-five club members	285.00
	<hr/>
	490.75

The expenses were:—

F. L. Temple, Contractor	\$261.24
Labor, outside of contract	6.00
Board of workmen	25.00
Materials and supplies	22.43
Expenses of Committee: transportation, camp supplies, guides, printing, postage, etc.	84.02
	<hr/>
	398.69
Balance in Club treasury.	92.06

It seems highly desirable to your Committee that the shelter be known and used *exclusively as a refuge*, that it may be found in order when the emergency arises which demands its use, and that justice be done the proprietors of the Summit

House, who have aided in every way the construction of this free lodging place so near their hotel. This restriction of its use has been published through circulars sent to all mountain hotels, and a large sign, reading "Not for pleasure camping," has been placed on the door.

We regret to report that in spite of these precautions the refuge has already been many times misused.

As the labors of the Committee appear to be completed, it is hoped that the Club will accept the refuge and discharge the Committee.

ALBION A. PERRY.

PARKER B. FIELD.

LOUIS F. CUTTER.

Report of the Recording Secretary for 1901.

ON January 1, 1902, the corporate membership of the Club was 1235. The losses during 1901 amounting to 83, and the accessions to 149, and three memberships having been revived, the net gain for the year was 69. The Honorary Members numbered 18, George M. Dawson and Joseph LeConte having deceased; and the Corresponding Members 49, Clarence King having deceased. There were 165 Life Members. The total membership was 1302.

The By-laws of the Club were amended so that new members are now elected by the Council.

There were held during the year nine regular, eight special, and one field meeting, the average attendance being about 230. Two of these meetings were held in Association Hall.

There have been presented, besides reports of officers and committees, twenty papers, seventeen of which were illustrated with the lantern. Seven evenings were devoted to the various sections of the Rocky Mountains, including two on the Canadian Rockies; New Hampshire might claim five speakers, three on Forestry, and two on matters relating to Mt. Washington; the remaining papers cover a range as wide as the world, — Maine, North Carolina, Cuba, Holland, Northern Europe, the Philippines, and New Zealand.

The Field Meeting was held at Gray's Inn, Jackson, N. H.,

from June 29 to July 6. Addresses were made concerning the forestry interest of the White Mountains, and there was a session for reminiscences of early days, it being the Club's twenty-fifth anniversary. Accounts of the Field Meeting and other excursions will be found in the report of the Excursion Committee.

The remainder of Three Mile Island, in Lake Winnepesaukee, became the property of the Club in the early part of the year. The camp was furnished in May, a boathouse with float was built in June, and eighty-three members and friends enjoyed the camp during the season it was kept open by the Club, July 20 to September 3. Several small parties have visited the camp at other times.¹

The Snow-shoe Section held its annual meeting in January. The membership is now 167. No meets were held near Boston on account of the small amount of snow. A third time the winter party has been to the Iron Mountain House, Jackson, N. H. The attendance was eighty-one; the time from February 16 to 24. Mt. Washington was ascended one day by nine members, the ascent being by Tuckerman's Ravine, Crawford Path, and the railroad, — all three parties descending together by the carriage road.

The annual social meeting was held at the Hotel Vendome, on Friday evening, February 8. The attendance was the largest in the history of the Club, 256 tickets being sold. A balance of \$39.58 was paid into the treasury by the Committee. An unusual number of informal receptions and reunions have been held at the Club rooms.

The residuary bequest of Capt. Julius A. Palmer, \$225, has been received and added to the Permanent Fund, being called the "Julius A. Palmer Fund."

A double number of APPALACHIA, Vol. IX., Nos. 3 and 4, was published in April. This was the finest publication the Club has ever issued, and appropriately marked the twenty-fifth anniversary of the Club's existence. The leading article, prepared by the editor, and entitled "Our Quarter-Centenary," gives a valuable summary of the Club's history, and has been issued in separate form.

¹ See page 73.

Early in the season the contemplated refuge near the Crawford Path was erected, and it is hoped that accidents like that of June 30, 1900, will no longer be possible. Much work has been accomplished in the various departments, for an account of which reference is made to the reports of the several Councillors.

The year's history has been specially marked by the generous gift, from Mrs. Hattie A. Farrar, of land and buildings on Pack Monadnock in southern New Hampshire. The real estate holdings of the Club now number seven, six in New Hampshire and one in Massachusetts.

A new lease of the Club rooms has been taken by the Council for a term of two years, beginning November 1, 1901.

Respectfully submitted,

ROSEWELL B. LAWRENCE,

Recording Secretary.

Report of the Corresponding Secretary for 1901.

THE Corresponding Secretary of the Club is pleased to report the continuance of cordial relations with many other societies of similar nature to itself, and the usual gratifying increase in the library. The number of societies in correspondence with the Club is now 118, and from these societies about 125 volumes of their publications have been received during the year.

The appended list gives the accessions in detail. An analysis of it shows that besides exchanges, fifty-four volumes have been acquired, nine by purchase, thirty-seven the gifts of fifteen members, and eight the gifts of publishers or authors. In deference to the growing desire of members for works of reference in natural history, Ridgway's "Manual" and Nuttall's "Ornithology" have been purchased. To accommodate the additions a third section of Wernicke bookcase has been placed in the reception-room, and a fourth will be needed at the very beginning of the coming year.

Work on the card catalogue has been actively continued during the year, half a dozen volunteers assisting. In addition to the care of the periodicals, in itself a work needing much time,

Miss Isabel Batchelder has catalogued many of the books. The other volunteers have aided in the important matter of analyzing the Proceedings and periodicals. The most active of these has been Miss A. E. Lanning, who has practically completed the cards for the publications of the American Geographical Society, some thirty volumes, while Miss L. G. Currier and Mrs. L. B. Tarlton have analyzed less imposing series. The separate articles are catalogued as if they were individual books.

The practical use of the library is being more and more appreciated by our members, about one hundred of whom have taken out books for home reading, while frequent application for its volumes is made to us by persons or institutions in other cities.

JOHN RITCHIE, JR.

Corresponding Secretary and Librarian.

Accessions to the Library for the Year 1901.

EXCHANGES.

AMERICAN SOCIETIES.

- Academy of Natural Sciences* (Philadelphia). — Proceedings, Sept., 1900–Aug., 1901.
American Geographical Society. — Bulletin, XXXIII.
American Museum of Natural History. — Bulletin, XIII.
California Academy of Sciences. — Occasional Papers, V., 8, 9.
Franklin Institute. — Journal, CLI., CLII.
Geological and Natural History Survey of Canada. — Report, XI.; Catalogue of Canadian birds, Part I.
Geographical Society of Philadelphia. — Bulletin, III. 1–2.
Mazamas. — *Mazama*, II. 2.
National Geographic Society. — Magazine, XII.
Smithsonian Institution. — Report, 1898, 1899, 1900.
Bureau of Ethnology. — Report, XVII. Pt. 2.
Torrey Botanical Club. — Bulletin, XXVIII. 1–2.
United States Department of Agriculture. — Bulletin of New England Weather Service, 1901.
United States Geological Survey. — Reports, XXI. 1, 6; Monograph, XXXIX.; Bulletins, 163–176; Atlas sheets, 95.
New York Botanical Garden. — Bulletin, I.

FOREIGN.

ALPINE AND TOURIST CLUBS.

- Alpine Club*. — *Alpine Journal*, 151–154.
Centra Excursionista de Catalunya. — *Butlletí*, 78–81.

- Club Alpin Français.* — Direction Centrale: Bulletin, 1901; Annuaire, 1901.
 Section des Alpes Maritimes: Bulletin, XX., XXI. Sections de Pau, Basque, etc.: Bulletin Pyrénéen, 20-23. Section Lyonnaise: Revue Alpine, VII. 1-11. Section du Sud-Ouest: Bulletin, XLVIII., XLIX.
- Club Alpino Italiano.* — Direzione Centrale: Rivista, XX.; Bollettino, 67.
 Sezione di Bergamo: Relazioni, 1898-1900. Sezione di Milano: Annuario, VI.-XI., XIII. Sezione di Napoli: L' Appennino Meridionale, II. 3-4; III. 1-4.
- Club Alpin Suisse.* — Comité Central: Jahrbuch, XXXVI., and Beilagen: Alpina, IX. Sections Romandes: L'Echo des Alpes, 1901.
- Club Alpino Siciliano.* — Sicula, V. 4; VI. 1.
- Club Touristi Triestini.* — Il Tourista, VIII., 1-3.
- Danske Turistforening.* — Aarskrift, 1901.
- Deutscher und Oesterreichischer Alpenverein.* — Central-Ausschuss: Mittheilungen, 1901; Zeitschrift, XXXI. Section Frankfurt-am-Main: Mitglieder-verzeichniss; Verzeichniss der Bibliothek.
- Kruimskål Gornuål Klub.* — Zapiski, 1901.
- Magyarországi Kárpát-egyesület.* — Jahrbuch, 1900.
- Norske Turistforening.* — Årbog, 1901.
- Oesterreichischer Alpenclub.* — Oesterreichische Alpen-Zeitung, 572-597.
- Oesterreichischer Touristen-Club.* — Oesterreichische Touristen-Zeitung, XXI.
- Piolet Club.* — Le Piolet, III. 1, 3-6, 8, 11-12.
- Scottish Mountaineering Club.* — Journal, 34-37.
- Siebenbürgischer Karpathenverein.* — Jahrbuch, XXI.
- Società Alpina Friulana.* — In Alto, XII.
- Società Alpina delle Giulie.* — Alpi Giulie, VI.
- Société des Touristes du Dauphiné.* — Annuaire, XXVI.
- Svenska Turistforening.* — Vägvisare, 17.
- Thüringervald-Verein.* — Monatsblätter, VIII. 10-12; IX. 1-9.

GEOGRAPHICAL SOCIETIES.

- Commissionen for Ledelsen af Geologiske og Geographiske Undersøgelser i Grønland.* — Meddelelser, 24¹ and Supplement.
- Gesellschaft für Erdkunde* (Berlin). — Verhandlungen, XXVIII.
- Imperatorskoye Russkoye Geographicheskoye Obshtchestvo.* — Izvestiya, XXXV. 7; XXXVI. 1-5; Otchet, 1900.
- Institut Géographique de Bruxelles.* — Publications, IV.
- Kais.-königliche Geographische Gesellschaft.* — Mittheilungen, XLIII.; Abhandlungen, II. 1-7.
- Nederlandsch Aardrijkskundig Genootschap.* — Tijdschrift, XVIII. 1-7.
- Royal Geographical Society.* — Geographical Journal, XVII.; XVIII.
- Royal Geographical Society of Australasia, Queensland Branch.* — Proceedings, XVI.
- Sociedad Geografica* (Madrid). — Boletín, XLIII. 1-2.
- Sociedade de Geographia* (Lisbon). — Boletim, XVII. 5-12. 25th anniversary.

62 REPORT OF THE CORRESPONDING SECRETARY.

- Società Geografica Italiana.* — Bollettino, II. 2-12.
Société de Géographie (Paris). — *La Géographie*, 1901.
Société de Géographie Commerciale (Bordeaux). — Bulletin, XXVII.
Société de Géographie Commerciale de Paris. — Bulletin, XXII. 6-10; XXIII. 1-9.
Société de Géographie de Tours. — *Revue*, XVII.; XVIII. 1-8.
Société Khédiviale de Géographie. — Bulletin, V. 8-9.
Société Neuchâteloise de Géographie. — Bulletin, XII.
Société Royale de Géographie d'Anvers. — Bulletin, XXIV. 4; XXV. 1-3.
Tokyo Geographical Society. — *Journal of Geography*, 145-150.
Verein für Erdkunde (Leipzig). — *Mitteilungen*, 1900.
Verein für Erdkunde an der Universität Wien. — *Berichte*, XXVI.

OTHER EXCHANGES.

- Among the Clouds.* — 1901.
Annales de Géographie. — 49-54.
Forester, VII. 6-12.
Geographische Abhandlungen. —
Intelligence Division, War Office. — *Geographical Index*, 1901.
Journal of School Geography. — V.
Journal de Zermatt. — XI. 7-10, 13-14, 17.
Nova Scotian Institute of Science. — *Proceedings*, IV. 2.
Observatoire Météorologique du Mont Blanc. — *Annales*, IV.; V.
Revue Géographique Internationale. — 298-309.
Teikoku Daigaku (Imperial University). — *Journal*, XIII. 4; XV. 1-3.
Upsala Universitets Mineralogisk-Geologiska Institution. — *Årsakrift*, 1901.
White Mountain Echo. — XXIV.

DONATIONS.

[Names of Members in Italics.]

- Album de Estatistica Graphica dos Caminhos de Ferro Portuguezes das Provincias Ultramarinas.
 Annual Report of Metropolitan Water Board, VI.
 Annual Report of New Hampshire Forestry Commission. Vol. I. Part I. 1893.
 Annual Report of Wachusett Mountain State Reservation Committee. I.
 Biennial Report of New Hampshire Forestry Commission. II., III.
 Chamonix. *Edward Whymper.* Gift of Author.
 Chisholm's White Mountain Guide.
 Le Conflit chilo-argentin, etc. Charles Rabot. Gift of Author.
 Cruising in the Madiana. *N. A. Lindsay.* Gift of Author.
 L'Enseignement de la Géographie. *E. Reclus.* Gift of Author.
 Explorations in the Sierra Madre. *C. Humboldt.* Gift of *A. Moore.*
 Following the Equator. Mark Twain. Gift of *J. Ritchie, Jr.*
 Geology of the Cascade Mountains in Northern Washington. *I. C. Russell.* Gift of Author.

- Geology of Water Resources of Nez Percé County, Idaho. *I. C. Russell.*
 Gift of Author.
- Göta Canal.
- Le Grotte dell' Altipiano di S. Servolo. *E. Boegan.*
- Guide to Wonalancet and the Sandwich Range. Gift of *J. Ritchie, Jr.*
- Guide to Zermatt. *E. Whymper.* Gift of Author.
- Improvement of the Charles River Basin.
- In the Guiana Forest. *J. Rodway.* Gift of *N. A. Lindsay.*
- Island of Cuba. *A. Humboldt.* Gift of *A. Moore.*
- Memoir of Life and Public Services of J. C. Frémont. *J. Bigelow.* Gift of *A. Moore.*
- The Mountain. *R. M. S. Jackson.* Gift of *J. Ritchie, Jr.*
- Naturalist in Mexico. *F. C. Baker.* Gift of *J. Ritchie, Jr.*
- Omaggio alla Memoria di Tommaso de Cambray-Digny.
- The Out of Door Library. 4 vols. *E. L. Wilson, E. L. Weeks, etc.* Gift of *L. B. Brooks.*
- Resources of Dakota. Gift of *C. W. Folsom.*
- Shepp's Photographs of the World. *J. W. Shepp and D. B. Shepp.* Gift of *L. B. Brooks.*
- Some Wild Flowers of Andover. *A. S. Pease.* Gift of Author.
- Taintor's Guide-books. 4 vols. Gift of *F. H. Burt.*
- To the Top of Mount Rainier with the Mazamas. *A. Inkersley.* Gift of *A. Moore.*
- Topographical Drawing, etc. *H. A. Reed.* Gift of *J. Ritchie, Jr.*
- United States Geological Exploration of the Fortieth Parallel : III. Mining Industry. *J. D. Hague and C. King.* Gift of *E. E. Hale.*
- Les Variations de Longueur des Glaciers dans les Régions Arctiques et Boréales. *C. Rabot.*
- The Variations of Glaciers. VI. *H. F. Reid.* Gift of Author.
- Waterville Valley. *A. L. Goodrich.* Gift of Author.
- Ways of Wood-folk. *Wm. J. Long.* Gift of *G. W. Taber.*
- White Mountain Region. *Jos. B. Walker.* Gift of Author.
- Wilderness Ways. *Wm. J. Long.* Gift of *G. W. Taber.*

PURCHASED.

- Bird-land Echoes. *C. C. Abbott.*
- Bird Portraits. *R. Hoffman.*
- Bird World. *J. H. Stickney and R. Hoffman.*
- In the Ice-world of the Himalaya. *F. B. and W. H. Workman.*
- Local List. *C. A. Cutter.*
- Mannai of North American Birds. *R. Ridgway.*
- New Ground in Norway. *E. J. Goodman.*
- Ornithology of Eastern North America. *Thos. Nuttall.* 2 vols.
- Sport and Life. *W. A. Baillie-Grohman.*
-

Treasurer's Report for 1901.

The receipts and payments for the year were as follows :—

RECEIPTS.

Cash on hand, Jan. 1, 1901, unappropriated	\$873.17	
“ for Mount Washington Refuge Fund	147.00	
“ “ Eliot Memorial Fund	86.00	
“ “ prepayments of subscriptions and obligations	116.00	
	<hr/>	\$1222.17
Bequest of Capt. Julius A. Palmer.		225.00
Life memberships, for Permanent Fund, 16 at \$30.00		480.00
Received for Mount Washington Refuge Fund		334.25
Annual assessments : 897 at \$3.00	\$2691.00	
Admission fees : 142 new members at \$5.00	710.00	
APPALACHIA and other publications :		
Sales of APPALACHIA and maps	\$104.97	
“ “ Walks and Rides about Boston	161.62	
	<hr/>	266.59
Donations :		
For Library	\$5.00	
“ Real estate	1.00	
“ Internal revenue stamp . . . . .	.02	
“ Rent of Club rooms	195.00	
	<hr/>	201.02
Rooms :		
Rent of keys	\$111.25	
Use of rooms	57.00	
	<hr/>	168.25
Field Meetings and Excursions :		
Sale of Club pins and buttons	9.40	
Annual Reception	39.58	
Interest :		
On Treasurer's deposit	\$39.93	
“ Permanent Fund, for 1901	227.84	
“ Reserve Fund, for 1901	53.97	
	<hr/>	321.74
Total unappropriated receipts in 1901	<hr/>	4407.58
		<hr/>
		6669.00
		<hr/>

PAYMENTS.

Trustees of the Permanent Fund :	
Life memberships, 16 at \$30.00	\$480.00

TREASURER'S REPORT.

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Stationery, Printing, and Postage :

Club Register for 1901	\$142.00	
General expenses	436.51	
	<hr/>	\$578.51

Clerical services 250.00

Library :

Books	\$25.25	
Binding and sundries	66.48	
	<hr/>	91.73

Expense of meetings 301.53

Rooms :

Rent and care, 12 months	\$1158.12	
Electric light	43.02	
Fittings and supplies	101.73	
Storage warehouse	23.10	
	<hr/>	1325.97

APPALACHIA and other publications :

Reprints	\$56.02	
Vol. IX., Nos. 3 and 4	1217.12	
Delivery of APPALACHIA and Register	142.79	
Business agent	50.00	
Walks and Rides : binding 150 copies	22.50	
E. M. Bacon, royalty on Walks and Rides	18.46	
	<hr/>	1506.89

Department of Art :

Sella collection	\$72.99	
General expenses	8.73	
	<hr/>	81.72

Department of Exploration and Forestry 62.16

Department of Improvements 140.72

Trustees of real estate 338.31

Mount Washington Refuge, expense of shelter 389.19

Donations :

William B. Curtis monument	\$25.00	
Mount Desert Map Co., 2d edition	15.00	
	<hr/>	40.00

Total expenses,

 5106.73

Cash on hand Dec. 31, 1901 :

Mount Washington Refuge Fund	\$92.06	
Eliot Memorial Fund	86.00	
Bequest of Capt Julius A. Palmer	225.00	
Prepayments of subscriptions and dues	45.00	
Cash unappropriated	634.21	
	<hr/>	1082.27
		<hr/>
		6669.00

Respectfully submitted,

RUFUS A. BULLOCK,

Treasurer.

TREASURER'S REPORT.

RECEIPTS FOR FIRST TWENTY-FIVE YEARS.

Year.	Measurements.					Life Membership.	Sales of Appalachia and other Publications.	Interest.	Annual Reception.	Field Meetings and Excursions.	Donations.	Total.
	Admission Fees.	Yearly Assessments.	Back Assessments.	Advance Assessments.	Total.							
1876	262.00	.....	.....	.....	262.00	.....	43.13	.....	.....	.....	.....	296.13
1877	50.00	254.00	8.00	.....	312.00	.....	98.00	.....	.....	.....	.....	410.00
1878	54.00	264.00	.....	.....	318.00	60.00	75.70	.....	.....	.....	43.00	496.70
1879	148.00	256.00	40.00	4.00	448.00	.....	130.85	1.90	.....	.....	221.70	802.45
1880	178.00	332.00	24.00	4.00	538.00	90.00	116.90	10.79	.....	.....	86.21	841.90
1881	222.00	384.00	18.00	12.00	636.00	120.00	141.40	17.59	.....	.....	62.55	977.54
1882	256.00	528.00	74.00	.....	858.00	90.00	309.43	22.07	.....	.....	2.00	1281.50
1883	386.00	1000.00	20.00	27.00	1442.00	210.00	197.58	39.72	9.72	82.88	22.00	2003.90
1884	285.00	1059.00	21.00	9.00	1374.00	60.00	93.51	53.29	26.80	11.47	1.00	1620.07
1885	375.00	1212.00	69.00	12.00	1668.00	60.00	113.19	61.09	45	70.73	534.50	2507.96
1886	425.00	1317.00	90.00	24.00	1857.00	330.00	247.94	88.62	12.50	124.35	364.20	3024.61
1887	385.00	1491.00	90.00	42.00	2008.00	180.00	183.80	79.34	10.00	40.20	114.00	2615.34
1888	355.00	1536.00	117.00	12.00	2020.00	180.00	67.06	42.52	9.20	45.94	754.76	3119.48
1889	655.00	1617.00	69.00	27.00	2368.00	120.00	93.85	151.29	11.48	.....	127.60	2872.22
1890	450.00	1620.00	24.00	15.00	2109.00	150.00	1168.13	217.12	3.73	.....	220.85	3868.83
1891	500.00	1743.00	12.00	9.00	2264.00	120.00	354.28	182.54	.....	146.27	20.00	3087.09
1892	560.00	1830.00	15.00	9.00	2414.00	300.00	625.22	130.29	.....	70.58	50	3540.58
1893	490.00	1908.00	6.00	.....	2394.00	300.00	20.97	431.90	.....	13.57	454.50	3614.94
1894	640.00	1968.00	9.00	12.00	2629.00	210.00	407.30	17.65	.....	14.04	22.25	3300.24
1895	385.00	2016.00	6.00	12.00	2419.00	90.00	66.69	241.70	20.55	.....	17.00	2847.94
1896	510.00	2076.00	6.00	42.00	2634.00	180.00	83.37	225.45	4.97	50.00	276.00	3453.79
1897	650.00	2094.00	18.00	15.00	2777.00	150.00	1197.87	251.48	.....	155.00	451.18	4982.53
1898	670.00	2235.00	9.00	27.00	2941.00	420.00	668.70	198.80	35.09	80.00	508.75	4852.34
1899	680.00	2346.00	15.00	.....	3041.00	690.00	251.88	220.76	47.10	150.00	377.38	4778.12
1900	725.00	2496.00	9.00	6.00	3236.00	780.00	345.79	455.24	33.30	75.00	1516.83	6442.16
Total	10296.00	33562.00	789.00	320.00	44967.00	4890.00	7102.54	3141.15	224.89	1130.03	6191.76	67637.37

EXPENDITURES FOR FIRST TWENTY-FIVE YEARS.

Year.	Permanent Fund.	Reserve Fund.	Stationery, Postage, and Printing.	Appalachia and Publications.	Department of Topography.	Improvements and Explorations.	Natural History and Art.	Clerical Expenses.	Expenses of Meetings.	Library.	Club Room.	Donations.	Total.
1876	.....	.....	109.91	140.86	.....	15.00	.....	.....	.....	.....	.....	.....	265.77
1877	.....	.....	60.65	364.13	.....	.....	13.45	.....	.....	.....	.....	.....	438.23
1878	.....	.....	202.31	169.80	2.00	20.00	52.48	.....	.....	.....	.....	.....	446.59
1879	90.00	.....	162.31	347.92	19.20	158.76	.....	.....	.....	.....	.....	.....	748.19
1880	90.00	.....	186.17	318.13	19.00	72.60	.....	.....	.....	.....	.....	.....	685.90
1881	120.00	.....	594.09	246.23	37.96	68.00	.....	19.75	22.70	.....	.....	.....	908.72
1882	90.00	.....	256.99	675.93	25.40	.....	.....	34.50	25.00	.....	.....	.....	1109.82
1883	281.72	.....	589.73	366.27	23.65	160.37	.....	67.41	1.38	.....	.....	.....	1360.31
1884	113.42	.....	589.73	1176.53	.....	21.00	.....	57.62	.....	69.78	.....	.....	1808.16
1885	86.48	.....	363.27	361.31	229.00	102.00	.....	106.00	53.06	72.50	294.17	25.00	1682.79
1886	270.00	.....	432.38	392.31	77.78	46.00	74.00	121.45	171.15	131.72	667.30	49.88	2974.52
1887	338.38	1000.00	289.38	597.59	538.97	123.02	20.12	107.12	145.45	102.50	504.81	.....	3786.46
1888	220.00	100.00	473.95	597.59	.....	118.58	8.32	49.50	98.45	120.56	456.12	.....	2069.04
1889	220.00	114.70	390.77	1127.91	7.20	46.07	86.76	123.75	68.36	67.33	487.34	.....	2813.20
1890	283.48	48.59	465.43	1689.95	.....	123.00	101.56	181.50	58.35	96.06	464.95	.....	3359.34
1891	306.64	605.71	389.27	1059.89	216.33	46.50	122.39	197.50	133.95	113.45	534.09	61.34	3523.61
1892	399.56	200.00	438.72	1066.18	.....	203.75	684.45	221.95	103.90	59.10	576.04	25.00	4456.88
1893	415.27	74.97	446.07	1066.18	.....	228.75	74.48	236.80	194.14	89.66	540.28	25.00	2945.19
1894	210.00	.....	398.49	947.59	.....	205.35	109.78	249.75	157.04	128.56	493.90	25.00	2677.36
1895	90.00	78.22	402.75	164.43	40.99	337.08	47.62	248.00	180.05	139.19	855.48	25.00	4866.52
1896	180.00	900.00	394.03	2418.28	.....	387.82	79.11	258.50	171.13	142.10	1243.66	25.00	5237.44
1897	150.00	200.00	506.15	2473.97	.....	227.95	74.39	249.50	181.85	161.96	1280.93	.....	4082.64
1898	420.00	.....	475.61	979.89	30.56	227.95	15.09	241.00	168.83	136.94	1100.84	.....	4505.68
1899	690.00	75.00	670.47	1007.54	.....	441.97	84.75	321.25	223.40	170.54	1237.50	.....	6245.20
1900	1780.00	485.55	632.70	981.04	16.00	312.47	.....	.....	.....	.....	.....	.....	.....
Total	6923.00	1683.74	9214.09	71434.30	1498.41	4726.09	1674.11	3283.85	2373.10	1977.95	1259.09	366.52	66415.20

* Decrease.

Report of the Trustees of the Permanent and Reserve Funds for the Year 1901.

PERMANENT FUND.—PRINCIPAL.

1901.

Jan. 1.	Amount of Permanent Fund on hand, last account	\$6923.95
	Amounts received from R. A. Bullock, Treas., for Life Memberships during year :—	
Feb. 11.	Henry A. Jenks	\$30.00
"	Dr. Francis H. Brown	30.00
"	Mrs. Francis H. Brown	30.00
"	Harlan P. Kelsey	30.00
"	W. Allen Lindsey	30.00
"	Francis A. Manning	30.00
Mar. 22	Miss Martha A. Vinal	30.00
"	Ellen P. Adams	30.00
"	Kate A. Ramstead	30.00
"	Edward G. Chamberlain	30.00
"	Miss Mary E. Perkins	30.00
June 20	Mary J. Watts	30.00
"	Richards B. Mackintosh	30.00
"	Miss Mary P. Osgood	30.00
"	Irving Elting	30.00
Dec. 26	Miss Grace D. Bachelder	30.00
		<hr/> 480.00
	Total Principal on hand January 1, 1902	<hr/> \$7403.95 <hr/>

PERMANENT FUND.—INTEREST.

Dec. 31.	Suffolk Savings Bank: 12 months, to Oct., 1901	\$34.42
"	Provident Institution for Savings: 12 months, to July 17, 1901	49.52
"	Lexington Savings Bank: 12 months, to Oct. 1, 1901	36.43
"	Eliot Five Cents Savings Bank: 12 months, to Oct. 10, 1901	29.88
"	Franklin Savings Bank: 12 months, to Aug. 1, 1901	18.16
"	Boston Five Cents Savings Bank: 12 months, to Oct. 1, 1901	17.16
"	Canton Institution for Savings: 12 months, to Oct. 1, 1901	22.27

68 TRUSTEES OF PERMANENT AND RESERVE FUNDS.

Dec. 31. Institution for Savings, Roxbury: 9 months,
to Oct. 16, 1901 20.00

“ Total Interest accrued during year 227.84

“ Paid Rufus A. Bullock, Treas., as per vote of
Council, accrued interest for year 227.84

1902.

Jan. 1. Total Principal on hand \$7403.95

This is deposited as follows:—

Suffolk Savings Bank, Book No. 100,753 . . \$1085.25

Provident Institution for Savings, Book No.
118,265 1452.57

Lexington Savings Bank, Book No. 1921 . . 1068.43

Eliot Five Cents Savings Bank, Book No.
32,233 876.29

Franklin Savings Bank, Book No. 70,143 . . 684.66

Boston Five Cents Savings Bank, Book No.
425,754 504.03

Canton Institution for Savings, Book No. 9015 . 712.72

Institution for Savings, Roxbury, Book No.
80,803 0.00

Delia D. Thorndike, bequest 1020.00

\$7403.95

RESERVE FUND.—PRINCIPAL.

1901.

Jan. 1. Amount Reserve Fund on hand, per last ac-
count \$1683.74

RESERVE FUND.—INTEREST.

“ Boston Five Cent Savings Bank, 12 months,
to Oct., 1901 \$44.55

“ Massachusetts Loan and Trust Co., 12 months,
to Jan., 1902 9.42

Total Interest accrued during year 53.97

Dec. 31. Paid Rufus A. Bullock, Treas., as per vote of
Council, accrued interest for year 53.97

1902.

Jan. 1. Total Principal on hand \$1683.74

This is deposited as follows:—

Boston Five Cent Savings Bank, Book 229,173 \$1369.55

Massachusetts Loan and Trust Co., note . . 314.19

\$1683.74

Jan. 1. Total Permanent Fund	\$7403.95
" " Reserve Fund	1683.74
" " in hands of Trustees	— \$9087.69

CHARLES H. FRENCH, } Trustees of the
 ISAAC Y. CHUBBUCK, } Permanent and
 REST F. CURTIS, } Reserve Funds.

The committee appointed to examine the accounts of the Appalachian Mountain Club respectfully report : —

We have examined the accounts of the Treasurer for the year 1901, and believe them to be correct. Proper vouchers were shown for all payments, and the cash on hand was verified, amounting to ten hundred and eighty-two dollars and twenty-seven cents (\$1082.27).

We have examined the accounts of the Trustees of the Permanent and Reserve Funds, and find them to be correct.

The Permanent Fund amounts to seventy-four hundred and three dollars and ninety-five cents (\$7403.95).

The Reserve Fund amounts to sixteen hundred and eighty-three dollars and seventy-four cents (\$1683.74).

The investments, as reported by the Trustees, have been verified.

JOHN E. ALDEN, } Auditing
 GEORGE N. WHIPPLE, } Committee.

BOSTON, January 4, 1902.

Report of the Trustees of Real Estate for 1901.

THE Trustees of Real Estate respectfully report : —

The trees planted upon the Lead Mine Bridge Reservation continue to live and to gain in beauty. Neat and appropriate signs have been made to mark the Reservation and protect it against trespass. Greater care upon the part of the Grand Trunk Railroad has prevented any such damage by fire, caused by sparks from its locomotives, as hurt our land last year.

The paths through and from the Randolph Reservation have been looked after closely by one of our Board, and the increasing use of them to gain the mountain summits is his best return, doubtless, for generous expenditure and unfailing attention. His associates are assured that no better mountain footpaths than these can be found elsewhere in this country, and few so good even in the most frequented mountain regions of other lands.

We have been much annoyed in the past by the entrance into the Reservation of horses pastured upon the land of Mr.

Watson, and every spring, travelling naturally upon our paths, they have done considerable damage. After conference with our neighbor, it was determined that, in place of the building of a partition fence, he would not pasture animals upon his land adjoining our Reservation until after written notice to our Board.

Upon the Joseph Story Fay Reservation the fencing has been finished; and the trees which were blown down during the severe storm of November, 1898, have been removed and sold. The lot upon the stage road to the Profile House, which had been sold by Miss Fay to the town of Lincoln for a school-house (which was afterwards used as a tenement house), has been obtained and taken within the limits of the Reservation. To make known that this Reservation is a memorial to Mr. Fay, there has been carved upon a big boulder on the western side of the highway, north from the sawmill, the inscription given in our report of last year.

The turbulence of the river during the spring and autumn freshets, and the quantity of water which it then pours down, threatened to make the narrow channel between the land within the village and the island the main channel, and so put our island to the east of the river, and also to cut a passage through the land itself. Both these dangers have been met by the strengthening of our banks with rocks, the building of a dam, and the planting of willows. The rains in the middle of December, causing the highest rise of water in the Pemigewasset River known for twenty years past, imposed a severe test upon the dam, which fortunately stood and the Reservation suffered no injury.

The Councillor of Improvements, in whose charge is the management of the Madison Hut, reports to us upon its condition, that on first inspecting the hut in June the bulging and cracking of the westerly wall was found to have increased considerably since the autumn of 1900. A close examination showed that the trouble was not due mainly to disturbance of the foundations by frost, though a slight movement of the foundation may have been a contributing cause, but to defective construction of the gable wall, the outer and inner faces of which are but slightly bonded together. The inner face remains in

place, or nearly so, but the outer face, yielding probably to the burden of the hanging masses of frost in winter, has been dragged outward and separated from the inner face, so that it is in danger of falling. In his opinion the remedy is to tear down the upper portion of the wall and rebuild it, taking care to have a number of stones extend entirely through from inside to outside, so as to bind the two faces together.

Three Mile Island and the Camp remain in charge of the committee previously appointed by the Board, and the information relative to their use and condition are contained in the report to us from the committee annexed to this Report.

The holdings of the Club have been increased during the year by gift from Mrs Hattie A. Farrar of four acres of land, with the buildings thereon, upon Pack Monadnock Mountain, in the town of Temple, in the State of New Hampshire.

A bill was reported by the Judiciary Committee of the New Hampshire House of Representatives exempting from taxation the lands in the State held by the Club in the public interest; but, unfortunately, though vigorously supported by many well wishers, it failed to pass. It, however, is our opinion that the discussion and the publicity in the newspapers have not been to our loss, and that the growing sentiment favorable to us throughout the State is likely to secure the passage of a similar act at the next session of the Legislature.

For the Trustees.

HARVEY W. SHEPARD, *Chairman.*

REPORT ON THE THREE MILE ISLAND RESERVATION AND CAMP.

To the Trustees of Real Estate : —

A few improvements were made during the year. A boathouse, with piazza, two runs, and a float, was built in May. Partitions were erected on the second floor of the Club-house, dividing the large area into two chambers and a passage. The two chambers were again divided by curtains into two apartments each. Corner seats were made in the living-room, and additional seats built in the lookout. The items of expenditure are given in the accompanying financial report.

With the help of members the house has been comfortably furnished. Ten single iron bedsteads and twelve canvas cots have been purchased,

besides chairs, tables, mattresses, etc. Mr. and Mrs. F. V. Fuller presented an aeolian and a large assortment of music. Mr. J. Ritchie, Jr., gave a double iron bedstead with mattresses, two pairs of blankets, and a handsome rug; Mr. G. W. Bunker, a case of drawers, two chairs, two mattresses, and pillows; Mr. E. C. Eastman, one chair, a mattress, and a pillow; Mr. F. O. Worthley, three chairs and three stools; Mr. I. Y. Chubbuck, a pair of andirons; Mrs. S. H. Little, a rustic table and pillows; Miss I. Batchelder, an air-tight stove; Mr. W. P. Fiske, a stove and an eight-quart double boiler; Mr. A. R. Bailey, a flag; Mr. A. S. Parsons, a megaphone; Miss H. A. Newhall, a pillow; and Miss M. A. Knowles, several pillows. Miss S. A. Stone gave two lamps and \$12.50, proceeds from the sale of silhouettes which she made of members of the camping party. A few books have been contributed to the library, among them "A Journey to Nature," presented by Mrs. P. R. Hollingsworth. The committee in charge of the island are much indebted to last summer's camping party and its committee for various contributions which render the camp comfortable and attractive.

The Club owns two large dories, which, with oars, etc., cost \$40.00. The boathouse also contains one boat and three canoes belonging to members.

An insurance of \$200 has been placed upon the boathouse, \$200 upon the boats and canoes, \$300 upon the furniture in the camp, and \$300 has been added to the \$1200 placed upon the camp last year. Thus the total amount of insurance now carried is \$2200.

Twelve platforms were built for tents, several by individuals and the others by the Committee. Most of the tents used were those in the custody of the Excursion Committee, and a few were hired for the occasion.

Again the Committee wish to express their appreciation of the services of Mr. H. P. Kelsey as landscape architect and forester. The plants which he contributed in the spring, together with labor, freight, and other expenses, came to \$131.08. Careful and judicious cutting has made the southern end of the island much more convenient and delightful for camping. A path, or rather trail, has also been made through the centre of the island and along the ridge to the north end, where a fine view of Red Hill and the Sandwich Mountains can be enjoyed. Branch trails lead to the tupelo swamp and the cliff swamp.

The Camp was opened to Club members on July 20th and continued open till September 3d. The first two weeks carpenters were at work, and the number of guests was small. August 3d the regular camping

party arrived. The largest number present at one time was fifty-one besides the help, which numbered eight. The total number of different persons in camp between August 3d and 17th was sixty-four. At the close of the appointed term, August 17th, twenty-four remained for a longer or shorter time, and nineteen new ones came before camp closed, so that the total number of campers was eighty-three. The Club party which was at Centre Harbor from August 31st to September 3d visited the island Labor Day. They numbered forty-one. There were, moreover, many other callers during the summer. To the reunion in Boston, December 6th, one hundred and thirty-three were invited and one hundred and twelve were present.

Twenty-eight tents were pitched to accommodate the campers, and in addition the houseboat *Iris*, together with her table and kitchen outfit, was kindly loaned by the owner, Mr. W. L. Chaloner. The steam launch *Mineola*, Captain E. E. Davis, was at the service of the party August 3d to 18th and on September 2d, and the launch *Fawn* was hired at various times. Seven boats and five canoes, some of them private, completed the flotilla. Mr. Frank B. Stevens, a Club member, who has a summer residence at Centre Harbor, often called at the island and entertained members by taking them out in his steam launch *Pinecroft*.

In addition to the summer season, the camp has been visited by members at other times. January 26, 1900, there were twelve callers, a small party of Club members being at Towle's Camp on Meredith Neck. The last of May a party of seven botanists and members of the Furnishing Committee spent four very busy days at the camp. The last of October a party of thirteen enjoyed the autumn foliage, and eight others came one day for dinner. Three visitors in early November and twelve in late December complete the list for the year. Thus it is very evident that the camp on Three Mile Island during the first year of its existence has been very popular, and we may predict for it many years of usefulness in promoting the health and enjoyment of Club members.

The improvements suggested for next year are not numerous. The boathouse should be completed, at a probable expense of about \$100. The Camp should have tents of its own and not depend upon hiring from dealers or borrowing from the Excursion Committee. Thus another \$100 could be spent. Moreover, the well should be finished, a trail made around the island near the shore, and some of the rocks should be removed near the boathouse and at the bathing beach. The forestry work should also be continued, affording the evergreens and

the more valuable deciduous trees a better opportunity to develop. To raise the funds for these expenses, Mr. Lawrence has offered to give two stereopticon lectures; in addition, subscriptions will be welcomed if any members wish to give.

The Committee hope to have the Camp open next summer for a period of six weeks, the charges being \$1.50 per day and \$9.00 per week. At other times members can obtain the use of the camp by consulting the Committee, the charge for rent being twenty-five cents per day for each person, with a minimum of \$2.00 per day for a party.

FINANCIAL REPORT ON THREE MILE ISLAND AND CAMP FOR THE YEAR 1901.

RECEIPTS.

Balance on hand February 15, 1901 (for furnishings, etc.).	
See APPALACHIA, IX. p. 362	\$238.22
Subscriptions for boathouse, etc. :—	
R. B. Lawrence, 50 ; R. A. Bullock, 25 ; J. Ritchie, Jr., 15 ; E. C. Eastman, 10 ; A. A. Perry, 10 ; E. W. Howe, 15 ; C. N. Mason, 5 ; E. A. Homer, 5 ; T. K. Gale, 50 ; H. P. Kelsey, 10 ; C. Newhall, 10 ; G. W. Taylor, 10 ; Winthrop Coffin, 10 ; Agnes W. Lincoln, 10 ; F. O. Worthley, 5 ; A. S. Parsons, 5	245.00
Subscriptions for furnishings, etc. :—	
C. F. Pierce, 20 ; Mary W. Eastman, 20 ; Edson C. Eastman, 19.50 ; J. Ritchie, Jr. (tent floor), 10 ; R. B. Lawrence (tent floor), 24 ; C. N. Mason, 10 ; L. E. K. Robson, 10 ; Miss H. J. Newhall, 10 ; N. A. Lindsey, 5 ; W. P. Hubon, 5 ; S. F. Whitney, 5 ; Blanche L. Ormsby, 5 ; Hattie A. Snell, 5 ; Mary Waterman, 5 ; E. E. Norton, 3 ; F. O. Worthley, 3 ; Henry Goodwin, 2 ; J. R. Carret, 1 ; Sarah S. E. Oliver, 1	163.50
From Miss S. A. Stone, proceeds from sale of silhouettes .	12.00
From sale of cots, washstands, etc.	15.10
Subscriptions for 1902 :—	
Mary A. Coe (for forestry), 10 ; E. C. Eastman, 10 ; Alfred Jones, 10	30.00
	<u>\$703.82</u>

PAYMENTS.

James P. Leighton, boathouse and float	\$243.00
“ “ partitions in camp	25.00
Town of Meredith, tax	17.60
New Hampshire Fire Insurance Co.	20.00

Standard Wire Mattress Co., bedsteads, mattresses, pillows, cushions	99.32
Geo. W. Bartlett & Co., stoves, labor, etc.	64.72
Wm. Leavens & Co., tables, chairs, etc.	52.25
Farley, Harvey & Co., blankets	42.00
C. H. Batchelder & Co., curtains, flag	25.05
Houghton & Dutton, washstands, knives, and forks	15.96
J. W. Beede & Co., dishes, fire irons, etc.	12.55
O'Shea Bros., shades, oilcloth, etc.	11.97
Pettingill & Pear, camp stools	9.50
Boston & Maine R. R., freight	8.99
Globe Gas Light Co., angle lamps	6.00
Bickford & Brown, boating furniture in May	5.00
Burditt & Williams, hooks	3.50
E. R. & E. H. Tarbell, lanterns	3.14
Page & Curtain, pails	3.00
Samuel Cabot, stains	5.25
Balance on hand, January 1, 1902 (for forestry, 10; and for improvements in 1902, 20)	30.02
	<hr/> \$703.82 <hr/>
ROSEWELL B. LAWRENCE, <i>for the Committee in charge.</i>	

Reports of the Councillors for the Autumn of 1901.

Natural History.

BY HARLAN P. KELSEY.

THE work of this Department the past year has been confined principally to making a collection of the flora of Three Mile Island. Numerous visits have been made and much assistance has been given the Councillor by other members of the Club interested in botany. Several hundred specimens of the trees, shrubs, and herbaceous plants have already been collected and dried for an herbarium, and it is intended, at the close of another season, to publish a check list of all the indigenous as well as introduced plants, including ferns and perhaps mushrooms, that may be found on the island.

So far twenty-five birds have been seen or heard upon or from the island the past season, the list being prepared by Mr. R. B. Mackintosh on May 31st and June 1st. It is hoped that members will report any new birds that may be observed on any

future trips, as it is probable that the number of species can be greatly added to. The list of those already identified is made a part of this report, as is also the list of native plants planted on the island the past year.

Native trees and plants to the number of 481, and in sixty-three species, were planted on this reservation last spring, and it is intended to increase this number in the future with other species of indigenous plants not already found here.

Three Mile Island has an extremely interesting flora, and it is much more varied than first observation would lead one to suppose. One of the rarest orchids in America, *Cypripedium arietinum*, was discovered here by one of the Club members, and a single station for the usually more northern *Clintonia borealis* was also located by the same member. The number of species and varieties of ferns growing in and near the swamp on the island is rather remarkable.

It is strongly urged that the fullest protection be given the native growth, and that no one dig plants or break or cut any trees and shrubs without permission of those in charge of the reservation.

After careful investigation it is found that there is a very abundant evergreen growth here, most of it at the present time being quite small, although on the northern part of the island it already gives a good effect. It is intended that the heavy growth of poplars and other less important trees shall give way in time to the development of these pines, hemlocks, and spruces, so that the island will be more sheltered and protected, and that it will eventually have a distinctive character when seen from other islands and from the Lake, which it does not now possess. At the present time the most characteristic growth is the birches, and these also should be especially protected and encouraged, as they lend quite as much character to the island as will the evergreens in the near future.

LIST OF NATIVE PLANTS PLANTED ON THREE MILE ISLAND, MAY 14, 1901.

(Britton and Brown's *Flora* is used as authority on nomenclature.)

BOTANICAL NAME.	COMMON NAME.
2 <i>Acer Pennsylvanicum (striatum)</i> , L. . .	Striped maple.
5 <i>Æsculus octandra (flava)</i> , Marsh . . .	Yellow buckeye.

NATIVE PLANTS PLANTED ON THREE MILE ISLAND. 77

- 2 *Alnus alnobetula* (*viridis*), K. Koch . . . Alpine alder.
- 15 *Azalea arborescens*, Pursh Fragrant white azalea.
- 11 " *lutea* (*calendulacea*), L. Great flame azalea.
- 15 " *Vaseyi*, Rehder Southern azalea.
- 29 " *viscosa*, L. Early white azalea.
- 20 *Abies Fraseri*, Lindl. Fraser's fir.
- 10 *Ampelopsis quinquefolia*, Michx., var. *Engelmanii*, Hort Scarlet Virginia creeper.
- 5 *Betula lenta*, L. Sweet birch.
- 5 " *lutea*, Michx. Yellow birch.
- 5 *Berberis Canadensis*, Pursh American barberry.
- 5 *Butneria* (*Calycanthus*) *Florida*, Kearney . . . Sweet shrub.
- 5 *Betula papyrifera*, Marsh Paper birch.
- 3 *Carpinus Caroliniana*, Walter Water beech.
- 2 *Catalpa catalpa* (*bignonioides*), Walter . . . Bean tree.
- 5 *Cornus alternifolia*, L. Swamp dogwood.
- 5 *Cephalanthus occidentalis*, L. Button bush.
- 5 *Clethra acuminata*, Michx. Southern pepper bush.
- 5 " *alnifolia*, L. Pepper bush.
- 10 *Cornus stolonifera*, Michx. Red-twiggèd dogwood.
- 5 *Chamaecyparis thyoides* (*sphaeroides*), B. S. P. White cedar.
- 10 *Clematis Virginiana*, L. Virgin's bower.
- 5 *Cimicifuga Americana*, Michx. American bugbane.
- 5 *Diervilla sessilifolia*, Buckley Southern bush honeysuckle.
- 5 *Dendrium* (*Leiophyllum*) *buxifolium*, Desv. . . Sand myrtle.
- 10 *Galax aphylla*, L. Galax.
- 10 *Hydrangea arborescens*, L. Smooth hydrangea.
- 5 *Hypericum aureum*, Bartram Golden St. John's wort.
- 5 " *densiflorum*, Pursh Bushy St. John's wort.
- 2 " *prolificum*, L. Shrubby St. John's wort.
- 5 *Helonias bullata*, L. Helonias.
- 5 *Ilex monticola*, Gray Mountain holly.
- 5 *Itea Virginica*, L. Itea.
- 2 *Ilex glabra*, Gray Inkberry.
- 2 *Juniperus Virginiana*, L. Red cedar.
- 30 *Kalmia latifolia*, L. Mountain laurel.
- 5 *Liriodendron tulipifera*, L. Tulip tree.
- 5 *Leucothoe Catesbæi*, Gray Catesby's leucothoe.
- 5 *Lonicera Japonica*, Thunb. var. *Halliana*, Arb. Kew (introduced) Hall's honeysuckle.
- 2 *Lilium Grayi*, Watson Gray's lily.
- 2 *Lilium superbum*, L. Turk's cap lily.
- 2 *Magnolia acuminata*, L. Cucumber tree.
- 2 " *tripetala* (*umbrella*), L. Umbrella tree.
- 2 " *Fraseri*, Walt. Fraser's magnolia.

- 2 *Magnolia Virginiana (glauca)*, Linn. . . Sweet bay.
 5 *Mohrodendron Carolinum*, Britt. (*Halesia tetraptera*) . . . Silver bell tree.
 5 *Oxydendrum arboreum*, D.C. . . Tree Andromeda.
 2 *Platanus occidentalis*, L. . . Sycamore.
 25 *Picea Mariana (nigra)*, B. S. P. . . Black spruce.
 25 *Pinus Strobus*, L. . . White pine.
 1 " *pungens*, Michx. f. . . Table Mountain pine.
 10 *Polygonum cilinode*, Michx. . . Creeping buckwheat.
 10 *Rhodora Canadensis*, L. . . Rhodora.
 5 *Robinia hispida*, L. . . Moss locust.
 5 *Rosa setigera*, Michx. . . Prairie rose.
 10 *Rhododendron Catawbiense*, Michx. . . Carolina rhododendron.
 30 *Rhododendron maximum*, L. . . Great laurel — rose bay.
 2 *Rubus laciniatus*, Willd. (introduced). . Cut-leaved blackberry, not native.
 2 *Shortia galacifolia*, Gray . . . Shortia.
 20 *Tsuga Canadensis*, Carr . . . Hemlock.
 3 " *Caroliniana*, Engelm. . . Carolina hemlock.
 20 *Xanthorrhiza apiifolia*, L'Herit. . . Yellow root.

BIRDS OF THREE MILE ISLAND, 1901.

NAME.	SEEN.	HEARD.	PLACE. ¹
1 Redstart	May 31	May 31	
2 Robin	"	"	
3 Red-eyed vireo . . .	"	"	
4 Veery	"	"	
5 Oven bird	"	"	
6 Black and white warbler	"	"	
7 Crow	"	"	
8 Water thrush . . .	"	"	
9 Whip-poor-will . . .	"	"	On Meredith Neck
10 Song sparrow . . .	"	"	
11 Black-throated green warbler			
12 Bobolink	"	"	Flying over Island
13 Swift	"	"	" " "
14 Barn swallow . . .	"	"	" " "
15 Goldfinch	"	"	
16 Nashville warbler . .	"	"	
17 Chestnut-sided warbler	"	"	
18 Chickadee	"	"	
19 Partridge	"	"	

¹ Where no place is specified the Island itself is understood.

20 Magnolia warbler . .	"	"	Hawk's Island
21 Blackburnian warbler	"	"	" "
22 Myrtle warbler . . .	"	"	" "
23 Phoebe	"	"	
24 Wood pewee	June 1	June 1	
25 Loon	"	August	Off the Island
26 Shell drake duck . .	October 26		" " "

Report of the Councillors for the Autumn of 1901.

Art.

BY L. LOUISE TARTTON.

THE first addition of the year to the collection of the Art Department of the Club, and perhaps also the most important one, was the large oil painting of the "Giant's Stairs" by Shapleigh, given to the Club by Mr. Charles C. Hall of Portsmouth, N. H. The picture, the subject of which is a familiar feature of the landscape looking west from the region about Jackson, N. H., has been hung upon the Club-room walls, where all may enjoy it.

Mr. Theodore S. Solomons of California, a fellow member, has added to his former gifts to the Club, by sending us seventeen of his views of the Tuolumne Canyon, and the region north and east of the Yosemite valley, and they have been mounted in an album purchased for the purpose. Our President, Mr. Alexis H. French, has given to the Club a number of his beautiful photographs which he has had mounted in an album, purchased for the purpose by your former Councillor, Miss Mabel C. Chester. It was her plan, and this is heartily agreed to by the present Councillor, to have the album reserved for Mr. French's photographs alone, with the hope that he would find it possible to increase in his own way and time this unique and artistic collection.

A small photograph of the Fünffingerspitze was received from Miss Annie S. Peck; a panorama taken from the hill just above Elliott's hotel at Waterville, N. H., was given by Mr. Geo. A. Clough; and Coolidge's souvenir portfolio of twelve views of Mt. Washington, from Mr. John Ritchie, Jr.

The card catalogue of the photographs of the Club has been continued during the year, but not completed.

A new duty has been added to those of the Councillor of Art, in the care of the greater part of the Sella photographs, which have been transferred to the Club-room, and permanently deposited in a case, made to receive them.

The first exhibition of the year was at the Annual Reception of the Club, when photographs of the trips of the past year were loaned by Mr. A. H. French, Mr. Charles E. Lord, Mr. F. Endicott, Mr. E. L. Homer and others; there were also shown albums of photographs by Miss K. Andrews, Miss S. Saunderson, Mr. G. D. Newcomb. Mr. Ritchie exhibited a group of views taken on earlier trips of the Club, in comparison with the more recent trips; Mr. Edward L. Rogers, an extremely interesting set of photographs taken on the Saturday outings of the year; and Mr. Walter L. Chaloner, a number of his beautiful paintings.

At the Room Committee's "at home" on April 15th, the walls of the Club-room were hung with the excellent photographs of the Selkirks and the Canadian Rockies, taken by the Messrs. Geo. and William S. Vaux, Jr., and Miss Mary Vaux, by whose favor they were loaned to the Club. The collection, all of which was either in passepartout or frame, was afterwards exhibited at the Boston Public Library. It is the intention of the Department to add permanently, in the near future, to the collection of the Club from these beautiful Vaux pictures.

An exhibition of paintings by members of the Club was given at the President's "at home" on May 14th. Mr. Walter L. Chaloner showed a fine collection; among them the large framed painting, "Woods in Winter," which he has kindly allowed to hang upon our Club-room walls ever since. Other exhibitors were Miss Sara A. Stone, Miss S. M. Barstow, Miss Florence L. Thallon, Mrs. Rufus P. Williams, Mr. Roger Tappan, Miss Helen M. Endicott, Miss Mary G. Dewick, Mr. Charles M. Cox, Miss Laura A. Jones, Miss Hattie J. Ford, and Mr. Percy W. Damon.

The Councillor of Art wishes to acknowledge the very great aid which the Department has received during the year in various ways, but in particular from Mr. Ritchie, the Chairman of the Room Committee, in arranging the various exhibitions at

the rooms, he having designed and had made a very convenient and compact frame for the better hanging of the pictures.

A red letter day in the calendar of the Art Department was the occasion of the "at home" of the Room Committee on November 18th, when we exhibited for the first time the wonderful collection of views of the highest Himalayas by Vittorio Sella, which had recently been received by the Sella Committee. Two telephotographic views of the beautiful peak of Siniolchum, 22,570 feet high, taken from the Zemu valley, were especially noticeable. The long panorama of the northwest side of Kanchinjinga taken from above the Kanchin glacier at a height of about 18,000 feet, and the other larger panorama taken after a snowstorm from the north side of the Zemu glacier at a height also of 18,000 feet, are perhaps the finest and most wonderful mountain views ever taken. By request, Mr. Rogers' outing photographs were also shown at this "at home."

In all cases, the exhibitions given at the Club "at homes" have remained at the rooms for a week or two after the opening, as have the photographs shown at the reunion of the Winter Snow Shoe trip to Jackson, and also those shown at some of the other reunions of Club trips.

The Department has purchased eleven polychromes of Swiss views to complete an album already begun by one of the former Councillors. These give a very clear idea of the regions represented, and are very interesting.

REPORT OF COMMITTEE ON SELLA COLLECTION.

THE most interesting fact that the Committee has to report is the addition to the Collection of a remarkable series of views in the Himalayas, generously donated in the spring by Mr. Sella. These views, some seventy in number (counting as individual pictures the separate sections of the panoramas), were taken during a visit made by Sella in company with Mr. D. Freshfield to the lofty central range of Sikkim and Nepal in 1900, during which a tour of Mt. Kinchinjunga was for the first time accomplished by civilized man.

This superb scenery, comprising the highest peaks of the known world, and the vast glaciers that encompass them, furnish forth a group of pictures doubtless without a parallel. The weather during the journey precluded all attempts to reach high summits, which gave

the party ample leisure and provided a perfect atmosphere for photographic work, as is testified by the exquisite results.

The majority of the single pictures measure seven and a half by nine and a half inches ; there are quite a number enlarged to eleven by fifteen inches, while in two of the fine five-sectioned panoramas the separate plates are fifteen by eighteen inches in size. These views were received unmounted, but during the summer were mounted with great care, and were ready for their first exhibition to the public at the Club-room from November 18 to 25.

This acquisition somewhat modifies the plans of the Committee regarding the selection to be made for a Loan Collection, alluded to in its last report. By reason of their exceptional novelty and interest, these views must naturally form a constituent part of this typical selection. On farther consideration, also, it has seemed to the Committee that the Loan Collection should contain fewer pictures than was at first proposed. Hence, it has been determined to select, in addition to this series, only about one hundred subjects from the Alpine, Caucasian, and St. Elias groups.

Probably the Himalayan views alone, or with perhaps a few selected subjects from other series for the sake of a comparison, will be exhibited in a few places before the Loan Collection as a whole is offered for exhibitions. The Boston Public Library has expressed a wish to exhibit them in its Art Department from January 15 to February 1, and they have already been promised to the Philadelphia Camera Club for a month's exhibition in that city, beginning with February 8. Still other requests are in the hands of the Committee.

The long-cherished desire to see these pictures appropriately bestowed in the Club-room has at last been fulfilled. The Council having generously appropriated fifty dollars to the object, the Committee has had made a plain but elegant cabinet of stained whitewood, of sufficient capacity to hold the entire Collection. It contains ten drawers measuring twenty-six by thirty inches, eight of which are divided longitudinally by a partition into two equal parts, the other two drawers remaining undivided to receive the enlargements.

In consideration of the valuableness of these views and the possible risk of loss, the Committee has thought it best to exercise a larger measure of caution than has usually been found necessary with respect to the Club's property stored in its rooms, and has voted that the Collection shall be accessible on request at hours when the rooms are officially open, the key to the cabinet being for the time in the keeping of the custodian for the afternoon.

CHARLES E. FAY,

for the Committee on the Sella Collection.

Reports of the Councillors for the Autumn of 1901.

Exploration and Forestry.

BY ALLEN CHAMBERLAIN.

AT the last annual meeting of the Club the subject of forestry was added to the duties of this Department,¹ and the incumbent of the office finds now, at the close of the year, that, as he is neither an explorer nor a forester, he has not been able to accomplish much for the honor of the organization. Fortunately, however, there are energetic explorers within our ranks, who have been able to carry the Club's colors into new territory this year, and to the undertakings of these gentlemen this Department contributed something at least toward their success through the loan of certain field equipment indispensable for such explorations as they carried out.

The councillor has received assurances from Professor Charles E. Fay and from Mr. George M. Weed, who were members of the two parties operating during the past summer in the Canadian Rockies, that detailed accounts of their ascents will be furnished for publication in APPALACHIA.

Since the Club has become to a small extent an owner of forested lands, and because of the organization's interest in the perpetuation of our country's sylvan charms, it seems eminently fitting that forestry should receive some formal recognition from us. It should not be inferred, however, that the Club is opposed to the legitimate utilization of the forest resources of the country, however much we may regret the passing of the old-time solitudes. That would place us in a most unenviable and unpatriotic light. A proper use of the forests is wholly desirable, and will tend to their perpetuation. That is forestry. It is to the ruthless waste of material, and to the stripping of the timber from those lands which are of little value for anything but forest growth, that we should stoutly object.

Our field for the present at least appears to be to aid in the work of spreading far and wide a more intelligent understanding of what forestry really is, and to encourage the adoption of such legislative machinery as will tend to give to the woodlands

¹ See proceedings of the Club for Nov. 14 and Dec. 12, 1900.

greater protection against their worst enemy, fire. We shall also be justified in straining the true meaning of the word "forestry" so that we may include within our province the care and maintenance of roadside tree growth, since that is one of the recognized assets of our New England towns.

To these ends, then, the Councillor has during this year made a few simple efforts. In the last issue of APPALACHIA (Nos. III. and IV., Vol. IX.) writings on the subject,¹ mostly government publications available to all, were briefly listed and reviewed. No such compilation had heretofore been made, so far as the Councillor is aware, and, judging from the numerous enquiries for such information which had reached his ears, he felt encouraged to give this list a wider circulation than would be afforded through the Club magazine. Proofs of the list were obtained, and these were sent to the leading daily and weekly newspapers throughout Massachusetts and New Hampshire. In this way the information, which was very generally used in one form or another, was carried even into the remotest districts.

¹ The following supplementary list deserves similar mention : —

The Profession of Forestry. An address delivered before the students of Yale University by Gifford Pinchot, Forester of the United States Department of Agriculture. Also an article on Study in Europe for American Forest Students, by Overton W. Price, Superintendent of working plans at the United States Forestry Bureau. Published by The American Forestry Association, Washington, D. C., 1901. Price, 25 cents.

North American Forests and Forestry. By Ernest Bruncken. New York : G. P. Putnam's Sons. 1900. Price, \$1.50 net.

Elements of Forestry. By F. B. Hough. Cincinnati : R. Clark Co. Price, \$1.50.

The White Pine. By Gifford Pinchot, Forester, Department of Agriculture, and H. S. Graves, professor and dean of Yale Forest School. New York : The Century Co. Price, \$1.00.

The Adirondack Spruce. By Gifford Pinchot. New York : G. P. Putnam's Sons. Price, \$1.00.

Practical Forestry in the Adirondacks. By Henry S. Graves. Bulletin 26 of the Bureau of Forestry, Washington, D. C. Price, 15 cents at Superintendent of Documents, Washington.

A Working Plan for Township 40. By R. S. Hosmer and E. S. Bruce of the Bureau of Forestry. Bulletin 30 of the Bureau.

Trees of the Northern United States. By E. A. Apgar. New York : American Book Co. Price, \$1.00.

The Earth modified by Human Action. By G. P. Marsh. New York : Charles Scribner's Sons. Price, \$3.50.

The Councillor has also kept in close touch with the forestry organizations of New England, and has taken occasion to inform himself on whatever transpired in the way of new forest or shade-tree legislation in the several States of the region. In the course of time it is hoped that the Club may become a potent factor for forest reform through the agency of this department.

NOTES ON NEW ASCENTS IN THE CANADIAN ROCKIES. BY JAMES OUTRAM.

1. *Mt. Vaux* (alt. c. 10,600 ft.). July 16, 1901. First ascent.¹
2. *Mt. Goodsir* (alt. c. 11,400 ft.). July 18, 1901. First attempt.¹
3. *Chancellor Grat* (four northernmost peaks). July 20, 1901. First ascents.¹
4. *Mt. Chancellor* (alt. c. 10,400 ft.). July 30, 1901. First ascent.¹
5. *Wapta Peak* (alt. c. 9000 ft.). July 23, 1901. First ascent. Mr. J. H. Scattergood, of Philadelphia, Chr. Bohren (guide), and myself. A castellated peak between Emerald Lake and the Yoho valley, with a magnificent view of the latter and unsurpassed panorama. Left hotel, 9.35; Burgess Pass, 11.40; summit of Mt. Field, 1.10 to 2.15 (this was a digression); reached base of a narrow, steep couloir on southwest face, the only possible way of access on this side, 3.15. A good scramble to talus, then to right extremity of upper ridge and by arête to summit, five P. M. Left 5.25; descent by easy slopes on west to base of rocks in twenty-four minutes; by Yoho trail to Emerald shacks, 7.45. Left 8.15, and reached Field at 10.05.
6. *Kiwetinok Peak* (alt. c. 9600 ft.). August 8, 1901. First ascent. Jos. Pollinger and Chr. Kaufmann (guides), and myself. From camp in Upper Yoho Valley, behind Emerald Mountain (alt. c. 6800 ft.). Started 5.30, proceeded up valley to Kiwetinok Pass, leading to Kiwetinok River, a tributary of Wapta north branch (c. 8300 ft.), in two hours; thence, skirting peak on east snow slopes, gained northeast ridge, and so to summit in one hour, fast. Returned by northeast ridge, continuing to "Signal Eighteen," and down its glacier to Insulated Peak. We discovered a porcupine on the edge of a crevasse, about 9000 ft. alt. (1500 ft. above timber-line), and photographed him. Camp, two P. M.
7. *Insulated Peak* (alt. c. 9300 ft.). August 14, 1901. First ascent. Mr. E. Whymper, four guides, and myself. For triangula-

¹ See paper on "The Ottertail Group," page 1.

tion and photographic purposes. A fine centre for views. About two and a half hours (slow) from Upper Yoho camp.

8. *Emerald Mountain* (alt. c. 10,200 ft.). August 9, 1901. First ascent. Jos. Pollinger and Chr. Kaufmann (guides), and myself. From Upper Yoho camp at 6.50, by way of glacier leading to Emerald Pass, on south side of peak. Col (c. 9800 feet), at 8.50; by steep snow and rocks to summit at 9.35. Fine view-point, but hail and snow fell, and after fifteen minutes we returned by same route. Descent one and a half hours. Fast throughout.

9. *Emerald (second peak)* (alt. c. 10,000 ft.). August 13, 1901. First ascent. See Ascent No. 10.

10. *Angle Peak* (alt. c. 9,800 ft.). August 13, 1901. First ascent. Party as in No. 8. Left camp 8.30; ascended glacier leading to col on north side of Emerald Mountain, for one and a half hours. Then by rock arête on our left, and steep snow slopes on northwest face of our peak to summit, at 11.30. At twelve descended northeast ridge to Angle Peak, where the range strikes southeast at less than a right angle, and following along arête overhanging main Yoho Valley, reached "Michael's Peak," first ascended by Professors Michael and Häslér in 1901 (*vide APPALACHIA*, April, 1901), at 12.45. Returned direct across snow field to col north of Emerald Mountain, thirty-five minutes, and to camp in forty-two minutes more. Fast throughout.

11. *Mt. Habel* (alt. c. 10,600 ft.). August 15, 1901. First ascent. Mr. E. Whympfer, C. Klucker, J. Pollinger, and C. Kaufmann (guides), and myself. Started at 4.45 from Upper Yoho camp, ascent through trees and up glacier to col northeast of Insulated Peak (alt. c. 8700 ft.). A sharp dip of three hundred feet to Habel glacier and two hours' steady walking over good snow to rocks at Habel's base. After a half hour's rest mounted glacier on east side of mountain, finely crevassed, crossed large bergschrund by ice bridge and by steep snow curtain to main south ridge, 10.20. Easy rocks and shale to summit in a half hour more. Magnificent panorama of enormous extent, specially interesting towards northwest and north, where the Freshfields, Forbes, Lyell, and Columbia lie. Return by same route, 1.30 to seven P. M., including two half-hour halts.

12. *Mt. Collie* (alt. c. 10,500 ft.). August 19, 1901. First ascent. Same party as for Mt. Habel. From a camp at the head of main Yoho valley, about fifteen minutes from snout of Wapta glacier, at alt. c. 6000 ft. Started 4.50; by ice from snout for about one hour, then easy slopes on southwest for an hour more. We then took to the upper glacier on the west of the main Wapta glacier, and went up it

to the centre of the east face; the south arête was struck fairly high up, about four hundred feet below the summit, at 10.40, and thirty-five minutes more, by a steep snow ridge, took us to the top. The view is similar to that from Habel, but forest fires obscured our vision. The western face of the mountain is a fine precipice. Return 2.30 to 6.40 by the same route.

13. *Trolltinderne* (alt. c. 9600 ft.). August 21, 1901. First ascent. Same party. From Yoho camp, 7.25. Crossed glacier snout and up the right bank of the ravine leading to glacier north of Trolltinderne. At 8.50, steep ascent ended, we crossed stream and worked diagonally to south end of the great ridge. Thence by wearisome shale and scree to the base of the square tower that crowns the summit. It is about one hundred feet high, sheer on three sides, and with smooth ledges with vertical faces five or six feet high on the one accessible side. Gymnastics enabled us to gain the top, four and a half hours from camp. Mt. Balfour, two remarkable vertical ice-falls on its cliffs, and the Upper Yoho valley are the finest features of a good view. Return in two and a half hours.

14. *Yoho Peak* (alt. c. 9300 ft.). August 18, 1901. This dome was first ascended from the Wapta glacier by Messrs. Dubois, Palmer, and Campbell, about the 14th. I climbed it alone by the sharp southeast ridge, from the Twin Falls, an interesting rock scramble, on the 18th. It is situated between the Wapta and Habel glaciers, and commands a fine view down the Yoho valley, and one of the most striking possible glacier panoramas in the Rockies.

15. *Balfour Pass* (alt. c. 8400 ft.). August 22, 1901. First traverse. J. Pollinger, C. Kaufmann (guides), and myself. This is a fine glacier pass, from the Yoho valley between Mts. Balfour and Gordon to Hector Lake and the Bow valley. Left Yoho camp six A. M., crossed glacier snout and rounded shoulder of Balfour spur to lateral valley separating it from Gordon, 7.15. Up this to the glacier, which we took to on the Gordon side, and followed the remarkable medial moraine that crosses the pass, curving under Balfour's north cliffs. The summit of the pass is almost level, reached 8.30 (fast). Soon after Mt. Hector and Hector Lake came in sight. Keeping too far to the left, we got into difficulties, arriving on the edge of a huge vertical cliff, and having to make a most interesting passage of the lateral ice fall to the centre of the glacier, above the main ice-fall. (The correct route is to follow the moraine and keep the middle of the glacier to the big ice-fall.) We crossed the glacier here, skirted the base of the cliffs opposite, and took to the tributary glacier on the south, and by

it gained the tongue of Balfour glacier, below the fall. Off the ice at ten (fast). Then by the trackless north shore of Hector Lake, a bad bit of going, till we crossed the Bow River at 1.30; after three quarters of an hour's halt, struck the trail at 1.50, and keeping up our rapid gait arrived at Laggan at 6.10 (with half-hour halts).

16. *Cathedral Mountain* (alt. c. 10,100 ft.). August 26, 1901. First ascent. C. Klucker and J. Bossonay (guides), and myself. Left Field 5.25, walked up railroad track three and a half miles, turned up slopes at 6.30. This was too far up the track, and we had to ascend diagonally to the west ridge, crossing it at eight o'clock at seven thousand feet. Extremely loose slopes of débris, as we traversed the ribs and gullies of the lower west side, were most disagreeable. Ascended by a steep, narrow couloir, just under the sheer cliffs of the main summit, and gained ridge at its top at 10.30 (alt. c. 9350 ft.). On the north lie the shattered *Cathedral Crags*, first ascended September, 1900, by my brother, C. Häslar, and myself by the steep glacier on the railroad side and the east face. On the south rises the main summit, which, by snow arêtes, we reached in thirty-five minutes more. The view is a very fine one in all directions, especially of the Divide mountains, Mt. Stephen, and the Ottertail range. Descent by the glacier to the northeast into Cataract valley, and so to Hector Station, two hours and twenty minutes from the top, and back to Field by the railroad track. Fairly fast.

17. *Mt. Assiniboine* (alt. c. 11,860 ft.). September 3, 1901. First ascent. See separate paper, page 43.

CLIMBS FROM THE VALLEY OF THE TEN PEAKS. BY CHARLES S. THOMPSON.

On the 16th of July, 1901, Professor George T. Little, Mr. George M. Weed, and Mr. and Mrs. Charles S. Thompson, joined a day later by Hans Kaufmann, guide, were at Wilson's permanent camp at Moraine Lake, Valley of the Ten Peaks. This is the easternmost of the three valleys (of which that of Lake Louise is the most western) that cut deeply into the summit range near the railway station of Laggan. Its upper end lies under the precipices of Mt. Hungabee, and points approximately a little north of west. The southeastern boundary is an abrupt rock wall, in many places almost perpendicular, which carries on its top ten glacier-clad peaks that give the valley its name. The opposite side is formed by Mt. Temple (11,600 ft.), and by a subordinate ridge thereof extending toward Mt. Hungabee and rising twice

in two sharp aiguilles known as The Pinnacles. The lake, lying at the mouth of the Alpine portion of the valley, is perhaps a mile in length, lying closely under the end of the ten-peaked wall. The camp is at the outlet near an immense boulder dam, possibly an old moraine, or more probably the fragments of an immense rock fall from the Tower of Babel, a truncated pinnacle that overhangs it.

Wenkchemna Pass. Our plan contemplated the crossing of a snow-covered watershed pass at the head of the valley, lying between Nep-tuak (nine) and Wenkchemna (ten) of the Ten Peaks, and taking its name from the latter. At the head of the valley (Mr. Wilcox's Prospectors' valley) on the other side of the pass lies Mt. Biddle, and it was our hope to attempt an ascent by some ridge from that side. As this would require two days, we all determined, while awaiting Kaufmann's arrival, to go to the summit of the pass and there cache some canned provisions to lighten the final portage. The pass had been twice crossed, and we anticipated no difficulty. Nor was there any save that of unhardened muscles and an ignorance of the easiest route. The proper route is along the western shore of the lake to a point near the inlet, thence along the Pinnacle (Sentinel) side of the valley to a small tarn half obliterated by rock falls, thence across all obstructions in an air line to the pass summit.

While Kaufmann was busily engaged on Thursday in bringing back to camp (through a misunderstanding) the tins that we had so laboriously carried to the summit of Wenkchemna Pass, we climbed, as an afternoon amusement, a buttress of the ten-peaked wall (alt. 8100 ft.) resembling in form and rock texture the Bee-Hive at Lake Louise. Behind the buttress was a long snow slope that made glad a quick return to camp.

The higher "Pinnacle." On Friday, the 19th, Weed, Thompson, and Kaufmann ascended the higher of the Pinnacles (about 10,000 ft.) by an obvious route, as seen from the valley floor, following the right-hand (east) edge of a snow-filled gully that scars the peak from summit to foot. In ordinary condition of the snow it would have been easy climbing, but we were compelled to take the rock face—slow, but not difficult. There was no cairn on the summit, and Kaufmann celebrated his first unclimbed peak by the erection of one worthy of Mt. Assiniboine. The view was excellent. The snow-covered pyramid of Temple was not more than two miles away and fifteen hundred feet above us. Across the valley were the Ten Peaks in curved array, further to the right (west) Hungabee, the southern face of Mt. Lefroy, and the peaks overlooking Lake Louise. Through the gap of

Wenkchemna Pass we could distantly see Goodsir, Vaux, and the Chancellor; at our feet on one side lay our own valley, on the other that known as Paradise valley.

Attempt on Mt. Hungabee. On the following day we succeeded in getting a horse, loaded with blankets, a Mummery tent, and two days' provisions, to the rocky tarn under Pinnacles; thence we carried the divided burden, not without difficulty, over the pass and down a mixed slope of rock and snow to the head of Prospectors' valley. We pitched our tent near the highest clump of dwarf spruces — an islet of green in the surrounding snow. Near by was a remarkable monolith about fifty feet high, having on its top a stone strikingly like a Hindoo image of Gautama, from which we called the whole "the Buddha stone." It was evident from our camp that evening that a successful attempt to climb Mt. Biddle from any point in Prospectors' valley was but remotely possible, and that the newly exposed southern face of Mt. Hungabee, hitherto rarely seen, offered an attractive series of gullies, not continuous, to be sure, but apparently capable, at least, of being patched together into a tempting possibility of success. A patch of snow lay far up the face. Between it and the highest point was perhaps seventy-five feet of rock face. On the condition of that rock face our success depended.

Between six and seven o'clock on Sunday morning Weed, Thompson, and Kaufmann started for the attempt. Little, having abjured climbing that summer, strolled up the valley to the window-like snow pass (Opabin Pass) that gives a fine view over Lake O'Hara towards Mt. Stephen and Cathedral Peak. The climbing party met the same difficulty with soft snow that they had experienced on the Pinnacle, a difficulty that considerably decreased their rate of advance. The route followed a very narrow snow-filled gully of considerable length, a channel of discharge for the winter's snows from above, situated at the top of a fan composed of the unmelted remnants of these avalanches near the base of the southeastern face. The ascent of the gully was the only difficult portion of the climb. Above this gully there was a short ledge traverse to a more southerly face, then a direct ascent up a snowy depression, hardly deep enough to be called a gully, to a point far up on the eastern ridge. By referring to the illustration in Professor Fay's article on American Mountaineering¹ showing the higher portion of Hungabee's northern face, it is possible approximately to locate the point that we attained. This portion of the peak somewhat resembles the outline of a jockey cap.

¹ *Munsey's Magazine*, March, 1901, p. 809.

The sky line of the visor, however, is not continuous with that of the crown, being separated from it by a deep reëntrant angle. The visor ridge, if I may use the term, extends therefore to a considerably higher altitude than is visible in the illustration, perhaps to an altitude of one half the total height of the crown, and runs out finally near the foot of the snow patch that I have above referred to at the highest visible point from our camp. Above the snow a southern ridge joins that of the crown, forming a highly inclined face of rotten rock about fifty feet in vertical height, with few opportunities for hand or foot. At its base Kaufmann halted, and after an examination decided against it. Leaving the rope, he passed around the reëntrant angle and examined the "crown" ridge. He returned in a quarter of an hour with the report that there was one gully possibly leading to the ridge, but it was filled with rotten ice, and a slip thereon would mean a fall, probably without a break, for half a mile into Paradise valley. "It is very bad." So we returned to camp. — It is perhaps unwise in a mountaineering paper to express personal opinions. I will, however, venture this: that the easiest ascent of the mountain will be up that wall face above the snow; that with time and care it can be done; and that when accomplished, the climber will find himself on a very narrow ice crest little if any below the true summit. The exact location of that summit is his reward.

Ascent of Mt. Temple. On Monday, the 22d, we returned to the Valley of the Ten Peaks. Weed, Thompson, and Kaufmann spent the next night in a high picturesque amphitheatre between the Pinnacle Peaks and Mt. Temple, where they pitched the Mummery tent preparatory to doing the latter mountain the following day. Starting at five o'clock, our route was taken directly up the centre of the southern face, curving gradually to the left, to the foot of a striking perpendicular buttress that overlooks Pinnacle Pass. Here, coinciding probably with the route of the two parties that had preceded us and which used Paradise valley as their base, we followed closely the southwestern ridge to the summit. There we found a small cairn holding a frozen bottle with the card of the two Canadian Pacific Railway guides who climbed in 1900. Of the party that made the first ascent in 1894 we found no record. The wind on the summit was bitterly cold and very strong. On the leeward side (east) toward our Moraine Lake camp, a fluctuating banner of cloud hid everything. Kaufmann broke a hole through the summit cornice, but only an occasional glimpse of rock ledge could be seen. The fall was very abrupt. To windward all the high peaks were visible, Deltaform, Hungabee, Lefroy, and

Victoria, but with their extreme summits mist-hidden. We were back at our temporary camp at two o'clock, and at Moraine Lake in time for supper.

First Ascent of the Second and Third (Fourth ?) of the Ten Peaks.

In our ramblings about the valley we had noticed a steep couloir, situated in about the central point in the crescent line of the Ten Peaks, by which it seemed possible to open an attack upon them. On Wednesday, Weed, Little (who yielded to extreme temptation), Thompson, and Kaufmann took the now well-trodden trail along the western side of the lake, mistakenly followed for half a mile the foot of the dreary moraine that chokes the southern half of the upper valley, and then with much weariness crossed to the foot of the couloir. We found it to be shaped like an hour-glass, and in its narrowest portion exposed to snowslides and occasional falling stones. The ascent (perhaps 1200 ft.) was invigorating and exciting. Breaking our way through a cornice at the top, we found ourselves at the apex of a large V-shaped snow field, sloping very gradually to Prospectors' valley, and bounded by four of the ten peaks, two on each side. We decided on the two nearest (one on each side of the apex) and took the higher (most easterly) first, a fine snow and rock peak (alt. 10,300 ft. aneroid), overlooking our camp. This is the second of the ten, the one called "Nom" (the Indian numeral for two) some eight years ago by Mr. S. E. S. Allen, of Philadelphia. We ascended its western slope in a brief thunderstorm, pelted with hail and our axe-heads singing. Truth compels us to state that we are uncertain whether the other peak that we climbed is the third or fourth of Mr. Allen's nomenclature. A study on our return of a copy of his rough sketch map leaves the matter uncertain. It is, however, the ninth in altitude (10,000 ft. aneroid), and lies directly at the western head of the couloir. We left the camp at 5.30 and were back at 3.00, returning from the foot of the couloir by a much easier route over winter snow lying in a series of depressions close beneath the wall.

On Thursday the outing at the lake came to an end. Little, Weed, and Kaufmann returned to Lake Louise by way of the Pinnacle (Sentinel) Pass, Paradise valley (which appears to merit a somewhat contrary name from those obliged to traverse its tangled woodland), over the saddle of Mt. Fairview, and thence down the bridle path to the Chalet. Mr. and Mrs. Thompson went on horseback directly to Laggan station. At ten that night a tired but reunited party went over the Great Divide to Field.

Reports of the Councillors for the Autumn of 1901.

Improvements.

By LOUIS F. CUTTER.

At the end of the season of 1900, all the paths for which the Club is responsible, with the exception of the Mt. Liberty path, had been put in good condition. A great wind in November of that year, and the storms of the following winter, brought down a great number of trees, so that an unusual amount of work was required this year to clear them out. Arrangements were made early in the season for clearing those on the Great Range, the Carter system, and those leading to the Ice Gulch and the Pond of Safety, and the work, with two slight exceptions, was faithfully done. Later, arrangements were made with the Waterville Athletic Association for clearing the Black Mountain path and the American Institution of Instruction path, and with Mr. Lucy, of North Conway, for clearing the Moat Mountain path. On account of the difficulty of obtaining reliable workmen, no clearing has been done this year on the Mt. Willey or the Car-rigain path, or the path over the Twin Range. The latter is reported in bad order, and will certainly need attention next year. No work has been done on the Passaconaway loop.

The Mt. Liberty path, since it was ruined by lumbermen several years ago, has been in very bad condition, and was reported almost impossible to follow. This year Mr. F. O. Carpenter supervised the construction of a new path to Mt. Liberty, to supersede the old one. It starts from a clearing called "Johnson's Mills," on the main road, two miles south of the Flume House, and three and one half miles north of North Woodstock, follows logging roads through the lumbered portion, and then strikes through uncut woods and ascends a steep ridge to the summit. A branch to accommodate people from the Flume House starts from the head of the Flume and joins the main path. The work was done partly at the expense of the Club, and partly by local subscription and volunteer labor. The expense to the Club was \$11.75.

The old bridle path up Mt. Lafayette, which in 1897 was partly cleared for use at the field meeting, was again cleared

and partly relocated by Mr. Carpenter in August of this year, the Club paying \$10.00 towards the expense. Mr. Carpenter advises its adoption as a Club path.

CAMPS.

The Hermit Lake camp narrowly escaped destruction in the storm of November, 1900. A number of trees in the immediate vicinity were blown down, and three of them fell across the camp, but fortunately did not break it down, and the damage done to the covering was easily repaired. The loss of the trees diminishes the beauty of the camping place, and the wind coming down the ravine has freer access to the camp, which, however, remains most attractive.

The Carter Notch camp, which was almost destroyed by wind last year, was rebuilt more firmly by the Lowes, in time for the Jackson field meeting. A hood was added, which, it is reported, has diminished the smoke nuisance. The cost of rebuilding was about \$25.00. Slight repairs have been made on Imp camp. Of the condition of Passaconaway Lodge no report has been received by the Councillor.

The Madison Spring Hut is held by the trustees of real estate, who, however, leave it under the immediate charge of the Department of Improvements. A detailed report on the condition of the hut has been made to the trustees by this Department, but it may be said here that it has been kept supplied with matches and candles, and furnished with four new stools and several candle lanterns. The path to the nearer outhouse has been drained. Recommendations have been made to the trustees for additional repairs next year.

NEW WORK.

Nearly all the Club paths now in existence are routes of general, and not merely of local usefulness, and it was thought that in the laying out of new work care should be taken to have the same hold true. In general, Club money should not be spent for improvements of merely local interest, but for paths and camps that will be of use to the membership as a whole. This condition is fulfilled by paths joining two or more settlements, and by paths giving access to points of general interest,

such as the principal mountain summits and great ravines. Furthermore, paths that are connected together in systems can be maintained with less expense than can isolated bits of path. It was therefore determined that whatever money should be available for new work in 1901 should be spent on connecting links forming parts of through routes from settlement to settlement, or else on extensions of existing systems of paths. Most desirable seemed a trail (which in future could be developed into a path) connecting the Waterville system with the extremity of the Twin Range system, so making a through route from Waterville to the Twin Mountain House. Another desirable route would be formed by a connecting link between the Waterville system and Shackford's. Opportunity to carry out the former scheme did not offer, but Mr. James Sturgis Pray kindly consented to locate and supervise the construction of a path from one of the local paths at Albany Intervale to some path of the Waterville system. If practicable, this was to pass through the depression immediately north of the north summit of Tripyramid. When, however, consent was sought from the owners of the forest through which the path would have to run, it was refused, on the ground of danger from fire, and consequently nothing was done towards carrying out the scheme.

The only new work actually carried out this year by the Department is the new path to the summit of Wildcat. This was made in time for the field meeting at Jackson, and was used by several of the members who participated in that meeting. The expense, \$24.00, was borne by the Excursion Committee. The path was engineered by Vyron Lowe and the Councillor, and was cut out with some modifications of line by Lowe & Bradbury. At a Council meeting in November it was adopted as a Club path under the name of the Wildcat path. It starts from the Nineteen-Mile Brook path at the height of land in Carter Notch, and zigzags up the northeast slope of Wildcat. The length is estimated at about three quarters of a mile, in which distance there is a rise of about a thousand feet. There is no view from the summit, but near by there is a splendid outlook to the east and south. The view includes Carter Dome, with its rugged gray cliffs rising above the boulder-enclosed lakes of the notch, and the Wildcat valley sloping away towards Jackson on

the south, as wild and rugged a scene as can be met with in New Hampshire. This outlook is reached by a short extension of the path. To the west there is no satisfactory outlook. On that side the slope does not descend rapidly from the summit, and the view of the Great Range, which might be expected to be especially grand, is marred and interfered with by a growth of spruce and fir, partly winter killed, and partly prostrate. A fairly good view in this direction can be had by climbing a birch-tree a little southwest of the summit, but nothing that is really satisfactory. On account of the very gradual slope, the Councillor does not believe that either a clearing of the trees, or a built-up observatory, unless of great height, would give a satisfactory view. There is, however, a ledgy knoll on the ridge of Wildcat, perhaps a mile south of the principal summit, from which there must be fine views to south and west. The path could be extended along the ridge to this knoll, and thence a trail might be blazed to the Carter Notch road in Jackson or one of its offshoots, affording a round trip to persons staying in Jackson.

WORK DONE BY OTHERS IN 1901.

A few improvements made by other persons and organizations in 1901 deserve mention. The Jefferson Notch road, which was mentioned in the last report of this Department as being projected, is now under construction. The length as laid out is about $13\frac{1}{4}$ miles from the Crawford House to E. A. Crawford's in Jefferson Highlands, about four miles being the distance from the Crawford House to Twin River Farm, and about $9\frac{1}{4}$ miles from Twin River Farm, through the Jefferson Notch between Mt. Jefferson and the Dartmouth range, to Jefferson Highlands. The New Hampshire legislature appropriated \$4000 for the section between the Crawford House and Twin River, and \$6000 for the section between Twin River and Jefferson Highlands. In addition to the above, \$5000 was subscribed for the latter section by persons interested.

The section between Crawford's and Twin River is now completed and ready for use. On the other section about $4\frac{1}{2}$ miles have been built, starting from the Jefferson end. This part of the road is 16 feet wide, and the many crossings of the south branch of the Israel are made on substantial bridges of the same width.

Mr. Anderson of the Mt. Pleasant House has continued the development of his system of paths and roads between Mt. Pleasant and the Ammonoosuc, and has constructed a field on the summit of Mt. Pleasant, within which persons can enjoy the view and yet be partly sheltered from the wind.

On Howker ridge, on Mt. Madison, a path has been located by Mr. E. B. Cook. He has had it partly cut out, and it will be completed and made ready for travel next June.

Mr. W. G. Nowell has placed signs and erected cairns on Lowe's path. President Moore and his son and Dr. Torrey have made a trail leading from Spur Cabin up the slope and along the plateau of Nowell ridge to the 6-kilometre sign on Lowe's path.

The committee of this Club appointed to erect a refuge on the Crawford Trail has completed its work, and will shortly make a detailed report to the Club.

An open camp of logs, covered temporarily with canvas, has been erected at Gulfside spring, near the col between Mt. Adams and Mt. Jefferson. The work was done partly by volunteer labor, but chiefly at the expense of Mrs. Evans, proprietor of the Willis House, at Gorham. Mrs. Willis may be deemed the proprietor of the camp, and all who wish to occupy it should apply to her. The capacity is about ten persons. How the existence of this camp will affect the problem of overcrowding at the Madison Spring Hut remains to be seen.

The problem here referred to has given the Councillors in recent years more anxiety than any other, and will probably continue to be a cause of anxiety in the future. In 1901, though the trouble has not been as bad as in some years, there have been several nights when more than the proper number have occupied the hut. On at least one occasion a person who had the right to occupy a bunk descended to the valley to avoid the unpleasantness of being crowded by persons who arrived later, and on one occasion a tired man in need of shelter was, rightly or wrongly, excluded from the hut by one of the rightful occupants, and was constrained to sleep outside.

THE MT. LIBERTY PATH. BY F. O. CARPENTER.

THE new path to Mt. Liberty, built in August, 1901, has two branches or forks, — one which begins at the head of the Flume, and another which begins at Johnson's Mills, two miles south of the Flume House on the highway. This later fork is more convenient for people in North Woodstock. The description in detail is as follows : —

NORTH WOODSTOCK BRANCH.

The path to Mt. Liberty begins at a point on the highway three miles north of North Woodstock and two miles south of the Flume House. The path leaves the road opposite a red barn, which is at the northern edge of the lumber village called "Johnson's Mills."

On a building a few rods from the road on the east side opposite the red barn is (in 1901) a sign which says "Mt. Liberty, five miles." Just beyond this house the path crosses the stream (middle branch of the Pemigewasset) on a log bridge, and follows a broad, clear logging road. If any branch roads appear, keep the well marked road to the left. Each fork was marked with a sign in 1901. The road climbs upward by easy grades, with several springs of good water along the way, unless in very dry weather. Two miles from the highway (forty minutes) the branch from the Flume joins the logging road near the lower end of the first snow-shed. Seven minutes up is a second snow-shed and twelve minutes more a third; twenty minutes further, the path reaches some lumber camps, three miles from the highway.

Two hundred feet beyond the lumber camp, the path bears sharply to the left or north (sign), following a log road not very distinct at first. The path follows up the wood roads, each fork or turn plainly marked (1901) by signs and three blazes, one above the other. One mile from the lumber camps (forty-five minutes) the path leaves the log clearing and enters the woods by a cool brook (sign "Mt. Liberty.") Ten minutes up (one hundred rods) is a branch path to edge of slide two hundred feet and water (big blaze on tree marked "Water.") The path to the summit (no water) leads up through old forest one mile. One half mile from clearing, the path winds about two narrow ledges, and the last quarter of a mile is on the edge of high precipitous crags where care must be used, as it is dangerous in a high wind from the east. The views along this shoulder are very inspiring, and blueberries make up for the lack of water. The path reaches the summit at the same point as the old path along the ridge from Lafa-

vette. The path to Mt. Lafayette begins to the north of the summit of Liberty at the foot of a sloping ledge (sign "To Lafayette"). The view from Mt. Liberty is second only to that from Mt. Lafayette in its beauty and breadth, and the rock summit of Mt. Liberty, inaccessible on the west, adds to the impressiveness of the view.

Ascent from Johnson's Mills to summit of Mt. Liberty, five miles, three and a half to four and a half hours; summit of Mt. Liberty to Johnson's Mills, two and a half to three hours.

FLUME HOUSE BRANCH.

The path to Mt. Liberty from the Flume House follows the carriage road to the Flume. The new path begins one hundred feet from the top of the Flume, above the highest cascade. A sign is placed where the path begins at the edge of the woods. The path runs in a northeast direction one half mile (twenty minutes), crossing one log road (sign) and ending at the second log road (signs and three blazes), where it joins the path from Johnson's Mills, as described above. Thence to top of Mt. Liberty. Flume House to Mt. Liberty four and a half miles, time three and a half hours; summit of Mt. Liberty to Flume House, two and a half hours. This branch path is clear, broad, and, although new, easy to travel. The paths were built the middle of August, 1901, and thirty to forty people went over the paths before the end of the season. The report of the climbers is that the new path is clear, quick to traverse, and a very much needed improvement. The path and its branches were built by David Gentiss, of North Woodstock, N. H. Several gentlemen volunteered their services, and aided in the work, giving their time and labor. These persons were: F. O. Carpenter (five days), C. H. Porter (three and a half days), R. Jones (one day), Mr. Perry (two days), Mr. P. F. Carpenter (two days), and Mr. Burke (two days).

OLD PATH TO MT. LAFAYETTE. BY F. O. CARPENTER.

THE old path to Mt. Lafayette, which was the natural approach to the mountain, with easier grades, wide views, etc., should never have been given up. It was reopened this summer for the Club under my direction. It will save climbers from the Flume House and North Woodstock two miles each way.

The path leaves the highway on the east side two miles south of the Profile House, and opposite the north end of the clearing (sometimes called "Lafayette Place"), where the path to Lonesome Lake begins.

There is a sign (1901) on the west side of the road, and another on the east side, where the path enters the woods. The path follows the route of the old bridle path for one half mile (fifteen minutes), then goes through the woods, well blazed, in an almost straight line, through fine, fairly open woods, with comfortable grades most of the way (one half mile, forty-five minutes), to the foot of a steep slope. Twenty minutes hard scramble up this slope, just north of the lumber clearing, brings the climber to the old bridle path (sign). From this point the old bridle path is used over easy grades, through stretches of shady walk hundreds of feet long, as perfect as when made, and which only needed the removal of a few windfalls. There are several glorious views from this path in different directions. The path leads up from its junction with the new path through the woods, one and one fourth miles (forty-five minutes), to a treeless shoulder of Lafayette, just above Eagle Lake (sign), where it joins the path from the Profile House. Thence the usual path to the top of Lafayette is used.

Distance from road to Eagle Lake junction three and a half miles, three to four hours; Eagle Lake junction to top of Lafayette one mile, forty-five minutes. Returning, top of Mt. Lafayette to road via old bridle path two and one half hours. The path was built the last of August and went into use at once. Twenty-five to thirty persons used it this summer, and found it clear and serviceable. The path was built by the same axeman, David Gentiss, that did the work on the Mt. Liberty path. Fifteen persons, men and women, went over the path the day it was cut, and camped in the open among the balsam scrub by Eagle Lake.

Report of the Room Committee for 1901.

THE Committee takes pleasure in reporting the interest which members continue to have in our pleasant rooms. On nearly every afternoon the reception room is a place in which one can count on finding pleasant company. Occasional receptions have been held as in former years. On April 15 President and Mrs. French were "at home" to members of the Club. The opening of the exhibition of the beautiful Vaux Collection was the occasion. In May the opening of an exhibition of water-color paintings by members of the Club — nearly a dozen were represented — afforded opportunity for a "reception" by the Room Committee, which artistically and for numbers present was a great success. The last "at home" of the year, also given by the Committee, was on November 18, when the exhibition of the splendid Himalayan views of Sella began.

As in past years the rooms have served for the meetings of the snow-shoe and bicycle sections and for committee meetings. The excursion parties have

made use of them for their reunions. A bird show by Mr. W. R. Davis was also given here. Among kindred societies that have availed themselves of them are the Massachusetts Forestry Association, the Teachers' Geography Club, and the Mycological Club. Exhibits by the last mentioned society were given on Saturday afternoons during the summer months.

The original lease of the rooms for five years having expired, a renewal has secured its present quarters to the Club for two years longer.

JOHN RITCHIE, JR., *for the Committee.*

Report of the Excursion Committee for 1901.

THE Excursion Committee during the year maintained a formal organization with meetings every month to discuss matters of interest or importance. It arranged and carried out eight excursions, with 471 persons participating, an average of 59. It also planned for 47 Outings, this matter being under the care of a sub-committee consisting of Messrs. Ritchie, Newcomb, and Wilde. Unfavorable weather interfered with four of the projected Outings, so that 43 were conducted, with an attendance of 1692 persons, an average of 39 per walk. This is an increase of two persons per Outing, although on account of the smaller number of Outings the total number is about fifty less than last year. In all, 2163 persons have attended excursions and outings.

EXCURSIONS.

The Winter Excursion — February 16-25 — was planned and conducted by the officers of the Snow-shoe Section, Messrs. W. R. Davis and R. B. Lawrence. The Iron Mountain House in JACKSON was again the headquarters of the party, which numbered 81. During the stay of the party trips were made to Double Head, Carter Notch, Iron Mountain, Resolution, Moat, and Kearsarge. The party through the Notch made, some of them, the ascent of Clinton, others of Willard. Various small parties ascended Mount Washington, three different groups, in all 9 persons, visiting the summit on the same day.

The proposed trip to Williamstown for Decoration Day was given up almost at the last moment on account of the demands which some college occasion was making upon the hotel and livery accommodations of the town, and a trip to the CHOCORUA HOUSE was substituted. This was in effect a repetition of the trip of last year. The party numbered 45 and left Boston on Wednesday, May 29, returning the following Monday. The weather was so rainy that no general ascent of Chocorua was possible, although small parties climbed to its summit and to those of other peaks in the range. Half-day drives were taken to Tamworth, Wonalancet Falls, and to Whitton's Pond. The trip was conducted by Mr. Charles E. Lord.

The thirty-sixth Field Meeting of the Club was held at Gray's Inn, JACKSON, N. H., during the week from June 29 to July 6, being the first summer gathering of the Club in this place for eighteen years. The attendance was

ninety-seven, some sixty coming from Boston by train. The week was characterized by exceedingly warm weather, although on nearly every day the summit of Mount Washington was clear of clouds.

The programme of the week was the following :— Sunday afternoon, informal walk up Thorn Mountain (17 members), Dundee drive (25) ; Monday, short walk in the morning to Eagle Mountain (6), all-day walk to Black Mountain (38) ; Tuesday, short walk to Duck's Head (6), all-day walk to Iron Mountain, returning across country (25) ; Wednesday, overnight party to the camp in Carter Notch, with Mr. Newcomb and with "Jock" Davis for guide (10), to Carter Notch and return (12) ; drive to Prospect Farm (28) ; Thursday, grand picnic to Crystal Cascade and Glen Ellis (60) ; Friday, all-day party to Double Head (12), party to Carter Notch (5), afternoon party to Wigglesworth Ledges (5).

On Tuesday evening a meeting was held in the casino of the hotel (see p. 111). On Thursday evening a very informal meeting of "reminiscence and retrospect" was held on the piazza, the speakers being Messrs. A. E. Scott, A. S. Parsons, and John Ritchie, Jr., each of whom recited the experiences of the Club in its meetings and excursions of a score of years ago.¹ On Friday evening Mr. C. E. Gale of the Eagle Mountain House tendered a complimentary hop to the Club members. About forty of the members attended and pronounced the affair very successful.

On Saturday, July 6, the meeting closed, the members dividing into three groups, one going to Boston direct with Mr. Taylor, another to the summit of Mount Washington by rail with Mr. Ritchie, and a third with Mr. New-

¹ A letter from Mr. Henck, the first Secretary of the Club, was read, of which the following extract is worthy of record :—

I well remember the summer preceding the formation of the A. M. C., a considerable part of which was spent with Professor Pickering (two Pickering's, I should say), and others of the original few of the Club, at Mr. Wentworth's hotel in Jackson, and the many mountains we climbed together, and the many "spider conclaves," of evenings and rainy days, over the embryo map of the White Mountains, which we were trying to evolve from very imperfect materials at our command.

It was while standing upon the summit of one of those mountains, I think Mt. Attitash, with Professor E. C. Pickering, that the first conversation on the desirability and feasibility of such a club took place between us. I remember but little more being said about the proposed club, until some time during the following winter, when Professor Pickering proposed a preliminary meeting, and I assisted in sending out invitations for it. The meeting was a success, and then and there the club was born.

Meanwhile the map-making had been going on, and the first APPALACHIA contained the result.

I think we thought then that we might possibly get together one hundred members, and that if we could reach such a number, much useful work could be accomplished. We planted our acorn, and cared for it, and behold — the oak.

With greetings to my old friends and best wishes for the success of the meeting,

Yours sincerely,

J. B. HENCK, JR.

comb, which the following day, the weather having made a postponement necessary, ascended Mount Washington by Tuckerman's Ravine. The same party made the descent on Monday over the Crawford Bridle Path.

The Field Meeting Committee was : Mr. John Ritchie, Jr., Chairman ; Mr. George D. Newcomb, Mr. George W. Taylor, and Mr. J. Allen Crosby.

The Club Camp of 1901 was in every way successful. Although the camp of 1900 was held on THREE MILE ISLAND, and was a large one, still the building of the camp and boathouse, the construction of a new wharf, and the relocation of a number of paths, together with other improvements, made the Island so different a place from the wilderness which was the feature of the first camp that it was decided to visit it again. The project aroused such enthusiasm that it was found feasible to keep the camp open during July and August, although the true Club camp lasted only about two weeks, during which the party numbered 80, while 30 or 40 more were in attendance during the early and later weeks.

The cutting out of vistas necessitated a somewhat different arrangement of the tents, so that a dozen board floors were laid in places too rocky to afford sites on the ground. These were in two groups, one at the southeastern point of the Island and the other in the centre of the southern shore. The sites of last year at Belknap Point were used again and a little "gipsy" settlement was established on the west shore on the boundary of the first Eastman gift, where last year there were two isolated tents. Every site had charming views and all were at the water's edge. Nearly every group had its own boat or canoe landing, improvised of drift materials from the lake.

The central camp — it has been suggested that it might properly take its name from the gentleman who has spent so much of time, money, and energy to establish it — was found to be ideal and practical. It formed a rallying place, a centre for the settlement, a rainy day retreat, a reading-room, writing-room and post-office, a hall for our informal hops, a gallery for art exhibits, a place in which to entertain visitors, besides the important use of housing some who did not care for tent life. Its broad piazza was a capital dining-room, which at times accommodated as many as sixty boarders. The broad fireplace formed a brilliant feature evenings, and the belvedere was a place of resort at sunset.

As the previous year, a steamer was chartered for the entire time and daily excursions were the rule. Sometimes the Mineola was aided by the Fawn, a boat of light draft which could visit little bays and traverse delightful water-ways navigable only by it or by row-boats or canoes. A fleet of boats, eight in number, and five canoes completed the naval outfit, which was none too large for the company.

The two weeks sped away quickly with the daily routine of boating, canoeing, bathing, rambling about the island, boat-races, and occasional excursions to the neighboring shores. Some 31 visited Diamond Ledge, — the summer home of Miss Alla W. Foster; 25 visited the summit of Red Hill, and as many the top of Mount Major, being entertained on the way at the camp of Mrs. E. B. Ward. Minor trips were taken to points about the lake, to Green's Basin and up Shannon Brook.

The camping trip of 1901 has again shown the beauties and advantages of Three Mile Island and the wisdom of acquiring it for the uses of Club members. It was under the management of Mr. R. B. Lawrence, Mr. J. Ritchie, Jr., and Miss M. A. Knowles.

The party Labor Day, numbering twenty-eight, left Boston for CENTRE HARBOR on Saturday, August 31, being preceded by two members the day before. On Monday they were joined by ten members of the walking party, making a total attendance for this trip of forty (40). Saturday afternoon, August 31, a visit was made to the Whittier Pine, in which twenty-six participated. Sunday afternoon, a party of twenty-three drove around Red Hill.

Monday (Labor Day) the whole party went to the Three Mile Island camp, and short boating trips were taken to adjacent islands and other parts of the Lake.

Tuesday forenoon, the majority of the members of the party walked for an hour toward Red Hill with the September Walking Party. The party returned to Boston, via Alton Bay, Tuesday afternoon. The weather was pleasant and permitted all of the Committee's plans to be carried out. Mr. and Mrs. F. V. Fuller were in charge of the excursion.

The WALKING PARTY gathered its members from the camp, the Labor Day party, and a special group direct from Boston, assembling at Three Mile Island on Monday, September 2, and passing the night at the Senter House, Centre Harbor. The real start was made on Tuesday morning with a walk by road and path to the summit of Red Hill and a scramble through the woods along its crest, the descent being made to a landing on Squam Lake where a launch was in waiting to convey the party to The Asquam on Shepherd Hill. On Wednesday the route lay through untracked woods over the Squam Mountains, across the fields to Prospect Hill, over the summit, — which was gained after a glorious scramble up an almost vertical cliff, — and down on the westerly side to the Percival farmhouse, the lunching place of the party of last year on its walk to the same hill. For a while the route then followed was that of last year, but, on reaching Campton Hollow, the intervalles and railroad were followed in preference to the highway. The resting place for the night was the Hillside House in Campton Village. Thursday morning the train was taken to Thornton, whence the route lay up through the Gore to the end of the Waterville-Woodstock path. This was followed to Waterville, though, on account of the logging operations and blow-downs, each group made its way to the hotel over a different path. On Friday morning the route lay down the valley along the river bank to the road and thence to the path up Sandwich Dome, the party making a stop for a while on Noon Peak. Luncheon was disposed of on the summit of the mountain and an acquaintance was made with the Canada jay, whose cultured habits were an interesting feature of the later trips of the Waterville party to the same summit. On the way up the party interviewed some spruce grouse, which were so fearless as to permit an approach

within three or four feet. The party reached McCrillis's in excellent condition. Saturday was devoted to Whiteface, the parties dividing on the summit and going by various routes to Miss Sleeper's at Wonalancet Farm. Some made the descent at once, others crossed to Passaconaway, and others still included the summit of Passaconaway in their day's march. Sunday was a day of rest. Small parties wandered to the various points of interest, some to the falls, some to the cave, others to Sunset Rock, — a dozen miles, perhaps, being the record of the most active. On Monday the regular itinerary was again taken up, with Chocorua Peak for the lunching place. The Brook path was the route selected. The day was windy at the summit, but not uncomfortable, and an hour or two were spent there. The descent was made by Mr. Pray's trail into the valley of the Swift River, and the night was passed at Shackford's. Tuesday was devoted to a walk through the Bear River gap to Bartlett. The reports of the difficulty of the trip caused it to be laid out for an all-day tramp, but it was necessary to linger at lunch and saunter and pick berries to avoid arriving at the Cave Mountain House before dinner. In the afternoon the party visited the Cave. Wednesday was designated in the programme as a day of preparation for the Mount Washington trip. It proved rainy and no trip was undertaken save a seven-mile walk along the river banks.

The itinerary of the Walking Party proper ended here, but nine of its members, desiring a little more exercise, made the ascent of Mount Washington by the way of the old Davis bridle path, spending two nights on the way. The first camp was on the side of Stairs Mountain, not far from the foot of the lower "stair;" the second, an open bivouac, three miles south of Mt. Isolation. The Summit House was reached early in the afternoon of the third day. The ancient trail was found to be practicable for the greater part of the way.

The record in distance for the party is not a large one — about one hundred and twenty miles in ten days: but there was a peak of about four thousand feet in nearly every day's march. The energy expended was therefore quite near the limit of prudence for a party of this character.

The leader of the party was Mr. John Ritchie, Jr.

The Autumn excursion to WATERVILLE, N. H., September 21-23, was conducted by Messrs. Newcomb and Taylor, the party including 89 members and friends. This brilliant week of sunshine and clear air will long be remembered by all who took part in the trip. The nights also were clear and cool. The party left Boston on Saturday morning, September 21, stopped for dinner at Plymouth and reached Campton village in the early afternoon. Carriages were in waiting for the fourteen miles of drive to Waterville.

Sunday was spent in short walks about the house, with a short service of song at Swazeytown in the morning. On Monday a party of 56 ascended Tecumseh, lunching on the summit and returning to the hotel in the afternoon. Tuesday there were two parties, one for Osceola (10 members of

which remained in camp at the summit overnight), and a second, which spent the night in camp at the head of the brook on South Tri-Pyramid slide. The latter party (8) will probably never again have a night with such grand views, although it was cold and windy. Signals were exchanged between the campers and the hotel. On Wednesday the President of the Club, Mr. French, led the walkers up to the Cascade, and the afternoon saw the return of the campers. Thursday was the day for Sandwich Dome (Black Mountain as it is here termed), and a party of 40 started, reaching the summit by noon. This was the clearest day of the week.

Three excursions were planned and carried out on Friday, one to the Scaur via the Kettles, another to Osceola, while the third climbed the south slide of Tri-Pyramid, passed over the two other peaks, coming down by the north slide. On Saturday the party returned to Boston.

The DRIVING TRIP—September 28 – October 7 — was through the Franconia Mountains and around the Presidential Range of the White Mountains. The party, consisting of eighteen persons, met at the Hillside House, Campton village, Saturday, September 28th : some had come from Boston overnight, the others, being of the Waterville party, reached there a little before noon of that day. The conveyances were two four-horse mountain wagons and an automobile, the latter carrying three persons. The route of the drive being circular was exceedingly interesting, and afforded opportunities for viewing the grandeur of the Presidential Range from different points, and comparing the merits of one view with those of another. Then, too, the drive afforded an opportunity for nearly every member of the party to cover new ground, and renew some old and perhaps slight acquaintance with a portion of the road. The color of the foliage was especially brilliant during the first days of the drive, but showed signs of too much frost in the region about Randolph and in the higher altitude of the Glen, whilst in the country between Wonalancet and Meredith many of the trees were still green, giving promise of beauty to come. The arrangement of time was such that opportunities existed for a little climbing. At Fabyan's many of the party improved the opportunity to view the Notch, clad in the gay colors of autumn, from Mt. Willard, while others climbed Mt. Deception. From Randolph a party went up through King's Ravine, intending to make the summit of Adams; but when the top of the head wall was reached, the driving clouds were so dense they descended to the Club Hut for lunch. Afterwards they ascended Madison, and were rewarded by glimpses through the clouds driven by a strong northwest wind. Later the clouds gave way to a clear sky, making the descent over the Durand Ridge in the late afternoon an experience not soon forgotten. A party up Thorn Mountain was stopped on the way by the lateness of the hour. Chocorua was climbed in a snow-storm, the party going as far as the house. The ledges at Randolph, also those at Wonalancet, were visited.

The last day, Wonalancet to Meredith, under the shadow of the Sandwich

Mountains, with the whole range from Chocorua to Sandwich Dome frequently in view, was one of great delight.

The itinerary of the party was as follows : Saturday, Sept. 28, Campton village to North Woodstock, Deer Park Hotel ; Sunday, to Flume House, visiting the Flume and Pool ; Monday, to Maplewood ; Tuesday, Oct. 1, to Fabyan's ; Wednesday, to Ravine House ; Thursday, at Ravine House ; Friday, to Jackson ; Saturday, to Chocorua ; Sunday, to Wonalancet. On Monday, Oct. 7, train was taken at Meredith for Boston. The distance travelled was about one hundred and fifty miles. There was enough rainfall during the trip to keep the roads in good condition, free from dust, but not enough to interfere with the movements or pleasure of the party. Mr. George W. Taylor was committee in charge of the trip.

OUTINGS.

Date.	Objective Point.	Leader.	Attendance.
Jan. 5.	Great Dome and Saw Cut Notch (Blue hills).	Mr. Ritchie.	53
12.	Sanborn's and Holy Cross hills (Lynn).	Mr. Bailey.	10
19.	Lynn Beach and Little Nahant.	Mr. Newcomb.	16
26.	Pine Hill (Medford).	Mr. Ritchie.	31
Feb. 2.	Fox Hill and Wampatuck (Milton).	Mr. Ritchie.	28
9.	Monatiquot Meadows and Braintree Great Pond.	Mr. Field.	38
16.	Stony Brook Pond (Roberts).	Mr. Chamberlain.	12
22 (all day).	Lynn Woods. Snow-shoeing.	Mr. Wilde.	38
Mar. 16.	Rattlesnake (West Quincy).	Mr. Ritchie.	16
23.	Montclair Links, Forbes Hill, Cunningham Woods.	Mr. Field.	51
30.	Salem Reservoir and Folly Hill.	Mr. Newcomb.	37
April 6.	Fells, Cascade, Virginia Wood.	Mr. Damon.	35
13.	Ashcroft. Cross country to Islington.	Mr. Moffette.	65
19 (all day).	Gloucester, Annisquam and Coffin's Beach.	Mr. Newcomb. Mr. Crosby. Mr. Wilde.	125
27.	Wiswall Hill to Riverside.	Mr. Chamberlain.	45
May 4 (all day).	Blue Hill range.	Mr. Ritchie.	30
4 (afternoon).	Hancock and Big Blue.	Mr. Newcomb.	62
11.	Bear Hill Brook (Waltham).	Mr. Chamberlain.	25
25.	Lexington to Winchester.	Mr. Newcomb.	12
30 (all day).	Lynn Woods.	Mr. Newcomb.	24
June 1.	Hemlock Bound, Braintree Pond, Blue hills.	Mr. Field.	12
8.	Lawrence Water Works, Glen Forest, Methuen.	Miss Emerson. Mr. Hale.	28
15.	Bellevue, Muddy Pond.	Mr. Crosby.	26

EXCURSIONS.

	17 (<i>all day</i>). Harbor Trip. Baker's Island and Lower Bay.	Mr. Newcomb.	123
	22 (<i>all day</i>). Rich, Noyes, and Powwow hills, Whittier Houses.	Mr. Ritchie.	31
Sept.	7. Brook Farm, West Roxbury.	Mr. Witherell.	24
	14. Cedar Hill Range, Westwood, and Dover.	Mrs. Moffette.	33
	21. Hull, Telegraph Hill, and Point Allerton.	Mr. Bailey.	49
	28. Braintree Pond, Blue hills.	Mr. Field.	44
Oct.	5. Payson Park Reservoir, Belmont, and Waverley.	Mr. F. V. Fuller.	46
	12 (<i>all day</i>). Great Blue Hill. { (<i>Morning</i>)	Mr. Ritchie.	5
	{ (<i>Afternoon</i>)	Mr. Crosby.	39
	19. Prospect Hill (Waltham) Worcester Pines.	Mr. Chamberlain.	43
	26. Codman Woods, West Roxbury.	Mr. Witherell.	59
Nov.	2. Naugus Head, Fort Miller, and Beacon Hill.	Mr. Lindsey.	65
	5 (<i>all day</i>). Ship Rock, Bartholomew Pond. {	Mr. Ritchie.	27
		Mr. Newcomb.	
	9. Wampatuck and Rattlesnake hills.	Mr. Ritchie.	75
	16. Westward, across country to Charles River Village.	Mr. Moffette.	54
	23 (<i>moonlight</i>). Pegan Hill, and South Natick, Wellesley.	Mr. Newcomb.	23
	30. Snake Hill and Devil's Den.	Mr. Chamberlain.	30
Dec.	7. Tucker and Bear hills, Milton.	Mr. Field.	25
	14. Lynn and Swampscott Beaches.	Miss Saunderson.	31
	21. Atkins's Outlook and Helmet Hill, Waverley.	Mr. F. V. Fuller.	24
	28. Hammond Woods to Newton Centre.	Mr. Newcomb.	23

1692

43 Outings. Average attendance 39.

EXCURSIONS.

Feb. 16-25.	Jackson Snow-shoe Party.	{ Mr. Davis.	81
		{ Mr. Lawrence.	
May 29-June 3.	Chocorua.	Mr. Lord.	45
June 29-July 6.	Jackson Field Meeting.	Mr. Ritchie.	97
Aug. 3-19.	Camp at Three Mile Island.	{ Mr. Lawrence.	87
		{ Mr. Ritchie.	
Aug. 31-Sept. 3.	Centre Harbor, Labor Day.	{ Mr. F. V. Fuller.	40
		{ Mrs. F. V. Fuller.	

Sept. 3-14.	Walking Party in White Mountains.	Mr. Ritchie.	14
Sept. 21-28.	Waterville.	{ Mr. Newcomb.	89
		{ Mr. Taylor.	
Sept. 28-Oct. 7.	Driving Party, White Mountains.	Mr. Taylor.	18
			<hr/>
			471
		Outings,	1692
			<hr/>
			2163

JOHN RITCHIE, JR.,	} Committee on Field Meetings and Excursions.
RALPH C. LARRABEE,	
CHARLES E. LORD,	
GEORGE D. NEWCOMB,	
EDWIN A. START,	
GEORGE W. TAYLOR,	
ALBION D. WILDE,	

Proceedings of the Club.

March 19, 1901. — Special Meeting.

President French in the chair.

About two hundred and seventy-five persons were present.

Mr. E. B. Holmes spoke upon his "Hunting Experiences in the Rocky Mountains of Wyoming."

Crossing the Teton Range by a high pass he met with a variety of interesting experiences in Jackson's Hole and the region beyond. His paper was illustrated by many views of the mountains as well as of the animals of the region.

April 10, 1901. — Two Hundred and Eighth Corporate Meeting.

President French in the chair.

The records of the last two meetings were read and approved. About two hundred persons were present. Nineteen candidates for corporate membership were elected.

Reginald A. Daly, Ph. D., instructor in Geology at Harvard College, gave an illustrated lecture on Labrador, and called attention to the need that exists for the exploration of this most interesting country. On account of the summer climate, Labrador is valuable as a health as well as pleasure resort. The views illustrated not only the scenic features of the coast and mountains, ice floes and bergs, but also the physiographical and geological characteristics of the region. The glacial period, raised beaches, and hanging valleys were discussed and illustrated.

April 23, 1901. — Special Meeting.

President French in the chair.

Two hundred and fifty persons were present.

The Rev. Dillon Bronson, of Brookline, gave an illustrated lecture upon his recent voyage from St. Petersburg to Stockholm, Copenhagen, and Christiania, thence around the coast of Norway to Bergen and northward to the North Cape, Spitzbergen, Danes Island, and the southern edge of the ice pack at a point near where the Fram emerged from her three years' imprisonment, and returning to England via Iceland and the Orkney Islands. Among the many fine views those illustrating the grand scenery of the Hardanger and Sogne fjords, the North Cape and Midnight Sun, and the mountainous Spitzbergen deserve especial mention. The lecture was enlivened by many good stories very well told.

May 8, 1901. — Two Hundred and Ninth Corporate Meeting.

President French in the chair.

The records of the last meeting were read and approved. About two hundred and twenty persons were present, including many members of the Boston Society of Civil Engineers, invited by President French, formerly president of that Society. Twenty-one candidates for corporate membership were elected.

Mr. J. Ritchie, Jr., read a short paper on the Excursion Committee and its methods of doing business and keeping accounts.

Mr. François E. Matthes, of the U. S. Geological Survey, gave an illustrated lecture upon "The Mapping of the Rocky Mountains by the Survey," explaining the methods employed in the roughest and highest mountain areas in the country, showing the camp life and means of transportation, and touching briefly upon the glacial cirques of the Big Horn Mountains.

A large number of interesting and beautiful views were shown illustrating mountains, glaciers, and lakes, and especially hanging valleys and cirques.

Remarks were made by Professor W. H. Niles, commending the lecturer's scientific work.

June 12, 1901. — Two Hundred and Tenth Corporate Meeting.

President French in the chair.

The records of the last meeting were read and approved. One hundred and sixty persons were present. Sixteen candidates for membership were elected.

Mr. Edwin F. Atkins addressed the Club concerning Cuba. Mr. Atkins, having owned a sugar plantation in Cuba for thirty years, is therefore very well informed upon the past and present conditions of the island. He mentioned the fertility of the soil and the effects of American tariffs upon the prosperity of the island, gave an account of the two insurrections, explained

the abolition of slavery, described the present situation, and gave his own opinion upon the solution of the difficult problems now before Cuba and the United States. His remarks were interspersed with lantern views showing the different classes of inhabitants, the agricultural and industrial conditions, and particularly the manner in which his sugar plantation was protected during the late insurrection:

Upon motion of Professor C. E. Fay a vote of thanks was extended to the lecturer.

June 29—July 6, 1901. — Thirty-sixth Field Meeting, Held at Gray's Inn, Jackson, N. H.

President French in the chair.

On Tuesday evening, July 2, a meeting was called to order by the President in the casino of the hotel, eighty members and friends being present. Mr. French called attention to the fact that this was the twenty-fifth anniversary of the Club.

Hon. Joseph B. Walker, of Concord, explained the condition of the New Hampshire forests and discussed the question whether forestry can be made remunerative. He gave figures showing the growth in value of a pine-tree.

Mr. Joseph T. Walker, Secretary of the Society for the Protection of New Hampshire Forests, gave an account of the work of that organization.

Mr. Harvey N. Shepard spoke on the subject, alluding to the destructive methods employed, the lack of interest in official circles, and the work of educating the people. He described the Club's reservations, and expressed the wish that some one might give the Club five thousand acres for practical forestry.

A vote of thanks to the Messrs. Walker was passed unanimously.

On Thursday evening an informal meeting was held on the hotel piazza, reminiscences being given by Mr. J. Ritchie, Jr., and ex-Presidents A. E. Scott and A. S. Parsons.

October 9, 1901. — Two Hundred and Eleventh Corporate Meeting.

Vice-President Howe in the chair.

The records of the last meeting were read and approved. About two hundred and twenty-five persons were present. Seventeen candidates for membership were elected. The Vice-President announced the appointment by the President of the following members to nominate officers for 1902: Mr. Rest F. Curtis, Miss Mabel C. Chester, Miss Clara J. Bates, Mr. Cheever Newhall, and Mr. Ernest N. Boyden.

Mr. R. B. Lawrence moved to amend, as announced, Art. III. of the By-laws, so that it shall read:—

Elections to membership shall be made by the Council, and the affirmative votes of at least four fifths of the members of the Council present and voting shall be necessary to election. Nominations, in the form of a recommendation, shall

be made in writing by at least two members of the Club, and forwarded to the Recording Secretary. They shall be announced on the call for a regular meeting, and members shall have two weeks in which to express to the Council their objections. Balloting by the Council shall take place at any time after two weeks from the publication. Each candidate elected shall pay an admission fee of five dollars (which shall include the annual assessment of that year), and subscribe assent to these By-Laws within two months after the election, otherwise the election of such candidate shall be void.

Mr. A. S. Parsons moved to amend the amendment by inserting after the first sentence, "but no person shall be admitted to membership against the written protest of ten members of the Club." This amendment was accepted by the mover, and after further discussion the motion as amended was passed, seventy voting in the affirmative and twenty in the negative.

The following amendments were then approved : —

Amend Art. XI., so that it shall read : —

The Council shall be the managing board of the Club, elect new members, control all expenditures, etc.

Amend Art. XX., so that it shall read : —

Corresponding members may be elected in the manner prescribed for the election of members of the Corporation ; and from among the Corresponding Members in the same manner Honorary Members may be elected, not to exceed twenty-five in number, etc.

Amend Art. XII., by changing eleven to fifty, so that the last line shall read : —

Fifty members shall form a quorum for business.

Amend Art. XIX., by condensing the first paragraph, so that it shall read : —

The real estate belonging to the Club shall be under the control and direction of a Board of Trustees, consisting of the Councillor of Exploration and Forestry for the time being, and four members of the Club, one being chosen by ballot annually to serve four years and until his successor is chosen.

Mr. Harvey N. Shepard then gave a description of his visit to Holland. About fifty excellent lantern views were thrown upon the screen, illustrating the various towns of Holland, the architecture of the churches and public buildings, the street and canal life, and a few of Rembrandt's paintings. The speaker's descriptions of the people and their customs, and particularly his allusions to Dutch history, were very interesting.

October 23, 1901. — Special Meeting.

President French in the chair.

One hundred and ninety-five persons were present.

A gavel, made from wood taken from Admiral Farragut's flagship, Hartford, and from Admiral Dewey's flagship, Olympia, was presented to the Club, the gift of the Chester family. On motion of Mr. H. N. Shepard a vote of thanks was passed for the beautiful gift.

Mr. Harvey N. Shepard then announced the transfer to the Club by Mrs. Hattie A. Farrar of land and building on Pack Monadnock, in southern New Hampshire, and on motion of the Recording Secretary a vote of thanks was passed for this valuable donation.

Dr. Lyman B. Sperry was the speaker of the evening. He first showed lantern views illustrating a trip to the Crown of the Continent, the pictures of the Lake MacDonald region, Sperry Glacier, and Cannon Mountain, being specially fine. He then lectured on "The American Indians, Their Beliefs and Customs." His experience as an Indian agent about thirty years ago gave him an excellent opportunity to study the race. The information he gave was very interesting and his pictures were excellent illustrations of the Indians' life, their war dances and other customs. He expressed the belief that the Indians are now "going the white man's way."

November 13, 1901. — Two Hundred and Twelfth Corporate Meeting; held in Association Hall, Y. M. C. A. Building, 7.30 P. M.

President French in the chair.

The records of the last meeting were read and approved. About four hundred persons were present. Nineteen candidates for membership were elected. The Recording Secretary announced that the portion of the Jefferson Notch Road from the Crawford House to the Twin River Farm had been completed and opened to the public.

The President then introduced Dr. Roland D. Grant, A. M., of Vancouver, B. C., and welcomed him as a representative of the "Mazamas" of Portland, Oregon. Dr. Grant preceded his lecture with a short "Mazama Study," bringing a greeting from the "Mazamas" to the Club, and illustrating upon the screen some of the climbs taken by them upon Mts. Hood, Jefferson, and Rainier. He then gave his stereopticon lecture, "The Land of the Geysers." A large number of beautiful views were shown illustrating the various features, and descriptions were given of the wonderful phenomena of the Yellowstone Park.

Second and final action was taken upon the amendment to the By-laws adopted at the October meeting, that to Article III. passing by the requisite three-fourths vote, and the other amendments without opposition.

November 19, 1901. — Special Meeting; held in Association Hall, Y. M. C. A. Building, 8 P. M.

President French in the chair.

About four hundred persons were present.

The lecturer of the evening was Rev. James Outram, and his subject, "The Exploration of the Ottertail Range in British Columbia and the first ascent of Mount Assiniboine." Among the Ottertail Mountains Mr. Outram was accompanied by Messrs. Fay and Scattergood of the Club, with Christian Häslar as guide. (See p. 1.)

Mr. Outram also showed views illustrating his explorations among the mountains of the Yoho valley in company with Mr. Whympers. Several

peaks in the Emerald Range were ascended and several new passes crossed. (See p. 85.)

The most interesting part of the lecture, however, was the first ascent of Mount Assiniboine. The trip to the base, as well as the return, was made in half the usual time. He was accompanied by the Swiss guides Christian Häslar and Christian Bohren. (See p. 43.)

The whole lecture was finely illustrated with stereopticon views of glaciers, cliffs, rock peaks, and snow cornices, and was in many ways one of the most interesting lectures ever given to the Club.

December 11, 1901. — Two Hundred and Thirteenth Corporate Meeting.

President French in the chair.

One hundred and eighty-five persons were present. The records of the two meetings in November were read and approved. The annual reports of the Councillor of Art, the Councillor of Exploration and Forestry, and the Councillor of Improvements, were presented, showing the work that had been accomplished during the year.

The President announced his appointment of the following Auditors: Mr. John E. Alden, Mr. George N. Whipple, and Miss Susan E. Withington; also the following Committee on the Annual Reception: Mr. John Herbert, Mr. Frederick V. Fuller, Mrs. R. P. Williams, Miss Mary A. Furbish, Miss Martha A. Knowles, Mr. Charles E. Lord, and Mr. Albion D. Wilde.

Professor Herschel C. Parker, of Columbia University, then gave the Club a stereopticon lecture entitled "Snow Climbs in the United States." After describing his ascents of Rainier, Hood, and Shasta, he told us of his many winter climbs among the White Mountains, and particularly of his ten ascents of Mount Washington by five different routes. The lecture was profusely illustrated. (See p. 19.)

December 19, 1901. — Special Meeting.

President French in the chair.

About two hundred and fifty persons were present.

The lecturer of the evening was Mrs. Mabel Loomis Todd, and her subject "The Philippines."

Mrs. Todd accompanied her husband, the astronomer, on the eclipse expedition to Sumatra, visiting the Philippine Islands on their way home. After giving a brief account of the history of the islands, she told of her experiences in Manila, of her visit to the Negritos in company with Dean Worcester, and of her trip with General Corbin on his tour of inspection among the islands of the archipelago, particularly to Iloilo and the Moros. The lecturer did not discuss political questions, but gave much information concerning conditions in the islands and measures now being introduced for the good of the people. The need of Chinese labor was emphasized, and the forestry policy strongly commended.

The lecture was profusely illustrated with lantern views, showing the interesting people and the beautiful scenery.

January 8, 1902. Two Hundred and Fifteenth Corporate (Annual) Meeting.

President French in the chair.

There were one hundred and thirty persons present, including ex-Presidents Fay, Edmands, Mann, Curtis, Parsons, Shepard, and Perry. The records of the meeting in December were read and approved.

It was voted to ratify the action of the Council in appropriating to the Permanent Fund the residuary bequest of Captain Palmer, \$225.00, and that it be called the "Julius A. Palmer Fund."

Mr. E. A. Start read the report of the Excursion Committee, and the Recording Secretary that of the Room Committee, both reports having been prepared by Mr. J. Ritchie, Jr., Chairman of those Committees. Professor C. E. Fay presented the report of the Committee on the Sella Collection, and Mr. A. A. Perry that of the Committee on the Mount Washington Refuge.

The Report of the Department of Natural History was then presented by the Councillor, Mr. H. P. Kelsey.

The annual reports of the Treasurer, Trustees of the Permanent and Reserve Funds, Auditors, Trustees of Real Estate, and the Corresponding and Recording Secretaries were then given. It was voted to accept the various reports and to discharge the Committee on the Mount Washington Refuge. In presenting the report of the Trustees of Real Estate, the Chairman, Mr. H. N. Shepard, made an appeal for the preservation of the Carlisle Pines.

The President appointed Mr. Allen Chamberlain a member of the Reception Committee in place of Mr. Fuller, who had declined.

Ex-President Rest F. Curtis, chairman of the committee to nominate officers for the year 1902, reported as follows : —

For President, Edward W. Howe ; for Vice President, A. Lawrence Rotch ; for Recording Secretary, Rosewell B. Lawrence ; for Corresponding Secretary, John Ritchie, Jr. ; for Treasurer, Rufus A. Bullock ; for Councillor of Natural History, Harlan P. Kelsey ; for Councillor of Topography, Frederic Endicott ; for Councillor of Art, Mrs. Lewis B. Tarlton ; for Councillor of Exploration and Forestry, Allen Chamberlain ; for Councillor of Improvements, James Sturgis Pray ; for Trustee of Permanent and Reserve Funds (for three years), Charles H. French ; for Trustee of Real Estate (for four years), Harvey N. Shepard.

The balloting resulted in the election of the candidates nominated. The retiring President, Mr. French, appointed ex-President Parsons a committee to introduce the President-elect, and Mr. Howe assumed the duties of the office.

The business of the evening having been concluded, Mr. R. B. Lawrence showed upon the screen thirty-one views taken by different members of the Club at Three Mile Island the past season. Some of the views taken in 1900 were also shown.

January 9, 1902. — Special Meeting.

President Howe in the chair.

About three hundred and twenty-five persons were present.

Dr. George Frederick Wright, of Oberlin, Ohio, a Corresponding Member of the Club, gave a very interesting account of his travels on the Continent of Asia in 1900. He first described a trip into the interior of China from Peking, just before the Boxer troubles came to a crisis, and then told of his trip across Manchuria, a state of war actually existing before he was safely away from the Chinese frontier. He stated that the Russians were unprepared for the Chinese attack, and were obliged in self-defence to adopt measures justified by a state of war. The trip across Siberia showed a prosperous country and many educated people. A journey of sixteen hundred miles by boat and tarantass brought the traveller to the Trans-Caspian Railroad, and the route lay thence across the Caspian Sea and the Caucasus to St. Petersburg. Interesting geological observations were made in regions where the *loess* formation abounds and especially at Lake Baikal. No evidences of glacier action were seen. A large number of lantern views illustrated the lecture.

January 16 and 30, 1902. — Special Meetings.

At these two meetings stereopticon lectures were given by Mr. Rosewell B. Lawrence, with the approval of the Council, for the purpose of providing funds with which to complete the boathouse at Three Mile Island, purchase tents, and meet other expenses. The tickets (one dollar for the two lectures) were placed on sale at the Club rooms, and the net proceeds amounted to \$136.50. The attendance was about one hundred and fifty at the first lecture and one hundred and twenty-five at the second. President Howe introduced the speaker.

The first lecture was entitled "Egypt, Ancient and Modern." The temples and monuments of ancient Egypt, the mosques and bazaars of modern Cairo, the Arabian and Nubian inhabitants of the country, and a three weeks' voyage up the Nile were illustrated by a hundred views.

On the second evening the subject was "The Holy Land."

The lecturer described a trip on horseback through Palestine in April, 1892. Ninety stereopticon views illustrated Jerusalem, Bethlehem, Nazareth, the Dead Sea, Jordan, the Sea of Galilee, Mount Hermon, Damascus, and the Cedars of Lebanon, together with the natives of the country and the camp life of the tourist.

February 12, 1902. — Two Hundred and Sixteenth Corporate Meeting.

President Howe in the chair.

One hundred and ninety persons were present. The records of the several meetings in January were read and approved.

Mr. Charles A. Hathaway, teacher of Botany in the Taunton High School,

gave an illustrated lecture entitled "Fellowship with Flower Folk." The lecture was both scientific and literary, — even poetical. A large number of beautiful pictures were shown upon the screen, many of them from carbon slides, and all the work of the lecturer. Beginning with the trailing arbutus and bloodroot of early spring, he proceeded with the flowers of the different seasons, even to the witch hazel and wintergreen. Special mention might be made of his pictures of the mountain laurel, azalea, lady's slipper and other orchids, iris, morning glory, meadow and water lilies. The common weeds were illustrated and a few butterflies and moths, and occasionally a landscape was introduced. With appreciatory remarks, Professor W. H. Niles offered a vote of thanks, which was passed with hearty applause.

March 5, 1902. — Special Meeting.

President Howe in the chair.

On account of a heavy snowstorm, only forty-two persons were present.

Mr. Frederick H. Newell, of Washington, Hydrographer of the U. S. Geological Survey, addressed the Club concerning "The Vacant Lands of the United States." By maps he illustrated the comparative areas of the earth's surface, — and particularly of the United States, — which may be considered arid, twenty inches of rainfall being taken as the dividing line between aridity and humidity. The injurious effects of grazing were mentioned and the contests between settlers, cattlemen, and sheepmen explained. The different methods of using water for irrigation were shown, and the surveys and studies of the Government engineers were explained. The plans for damming the Gila River, building a reservoir in the Hetch-Hetchy Valley and drawing upon the Gunnison by means of a tunnel, were especially interesting. Among the lantern views shown was one of the Austin dam when it gave way, and several illustrating a hazardous exploring trip through the Gunnison canyon. At the conclusion of the lecture a vote of thanks was passed.

Mr. J. A. Ockerson, of St. Louis, a member of the U. S. Commission for the Improvement of the Mississippi River, was then introduced, who spoke briefly of the proposed exposition to commemorate the Louisiana Purchase.

March 12, 1902. — Two Hundred and Seventeenth Corporate Meeting.

President Howe in the chair.

About two hundred persons were present. The records of the last two meetings were read and approved.

Professor Alfred E. Burton gave an illustrated lecture entitled "An Eclipse Expedition to Sumatra in 1901." Views were shown illustrating the journey through the Suez Canal and across the Indian Ocean to Sumatra, with subsequent stops at Singapore, Hongkong, and Shanghai; but the larger part of the photographs showed the natives of Sumatra, their habitations and customs, the scenery and luxuriant vegetation, and par-

ticularly the buildings erected for the observations. Two very fine slides illustrated the eclipse itself, one the prominences and the other the corona. The station was in the interior of Sumatra, 120 miles from Padang.

April 3, 1902. — Special Meeting. Held in Huntington Hall, 8 P. M.

President Howe in the chair.

This meeting was unusually successful, being marked by the presence of Sir Martin Conway, the President of the English Alpine Club, who was pleased to meet the members of the Appalachian Mountain Club, of which he is an Honorary Member, and gave a short address upon his exploration of the Baltoro Glacier and his ascent of Pioneer Peak (23,000 feet) in the Himalayas. It was an exceedingly interesting story of exploration and adventure, told in a very modest fashion. With the help of maps he described the mountains of central Asia and pointed out the giant peaks of Kashmir. The characteristics of the coolies and difficulties of transportation were mentioned, the long climb up the Baltoro Glacier was described, and finally the ascent of Pioneer Peak, which is one of the minor summits of the Golden Throne. The lantern slides were made from the illustrations in the speaker's recently published book, the most effective being those of Masherbrum, Gasherbrum, K. 2, the Golden Throne, and the Bride seen from the arête of Pioneer Peak. The success of the last mentioned view surprised and pleased even the lecturer.

At the conclusion of the lecture the President introduced Professor C. E. Fay, who spoke with warm appreciation of Sir Martin Conway's explorations, and expressed the pleasure of our members in meeting and hearing him. About three hundred persons were present, including an unusual number of original members, ex-presidents, and members who have climbed in the Canadian Rockies, Andes, and Alps, or have visited Greenland and Spitzbergen. The meeting was followed by an informal reception in the Library.

April 9, 1902. — Two Hundred and Eighteenth Corporate Meeting.

President Howe in the chair.

One hundred and eighty-five persons were present. The records of the last two meetings were read and approved. Mr. H. N. Shepard announced, in behalf of the Trustees of Real Estate, that the Massachusetts Forestry Association had succeeded in purchasing the Carlisle Pines and had conveyed the property to the Club.

Mr. T. B. Lawler gave an illustrated lecture on "The Philippines." Beginning with a map and the early voyages of discovery, he showed views of Manila and other towns, and illustrated the people, their habitations and customs. The dug-outs, the peasants' shacks, and the city gates were especially interesting.

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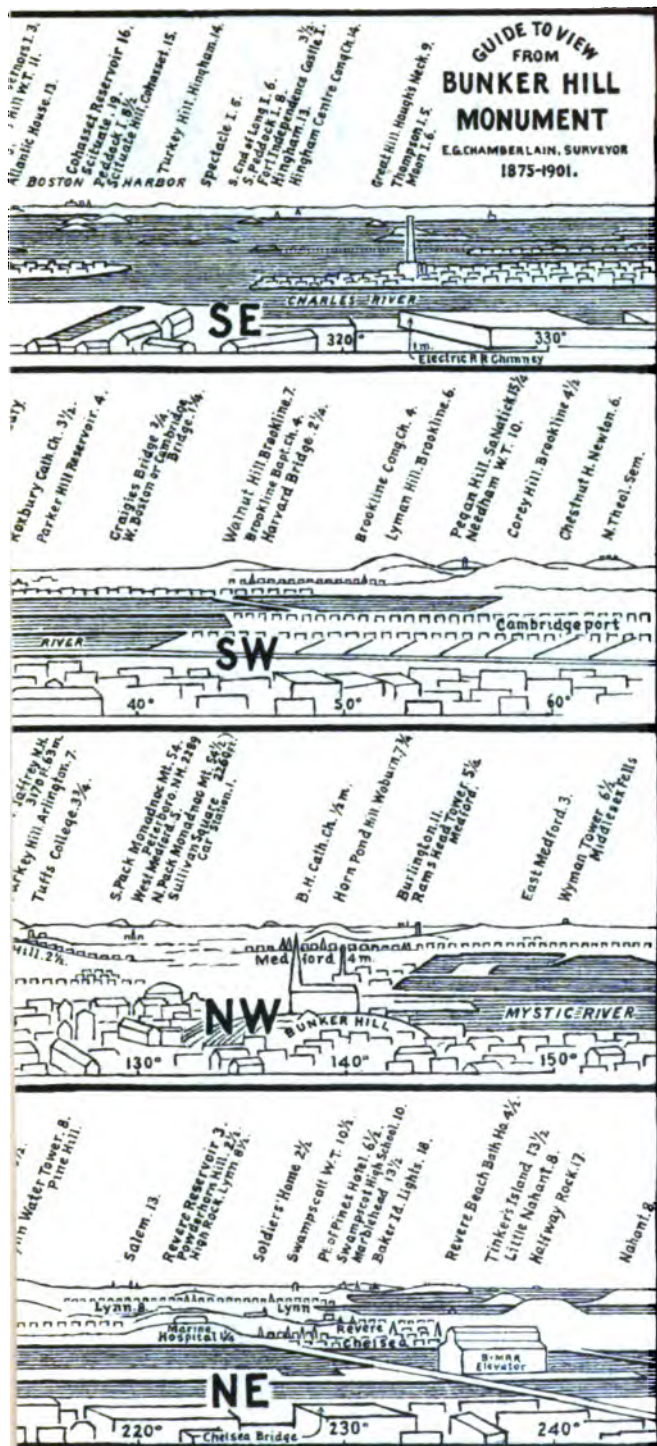
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WEIGHTS OF MOUNTAINS IN FEET.

TO ASSIST IN THEIR IDENTIFICATION DISTANT OBJECTS ARE SHOWN MAGNIFIED, AND VERTICAL ANGLES ARE EXAGGERATED IN THE DISTANCE AND SHORTENED IN THE FOREGROUND.

DISTANCES ARE GIVEN IN MILES.

<p>1. The first part of the report is a general statement of the purpose and scope of the investigation. It is followed by a brief review of the literature on the subject.</p>	<p>2. The second part of the report is a description of the methods used in the investigation. This includes a description of the subjects, the experimental design, and the procedures used to collect and analyze the data.</p>	<p>3. The third part of the report is a presentation of the results of the investigation. This includes a description of the data, a summary of the findings, and a discussion of the implications of the results.</p>	<p>4. The fourth part of the report is a conclusion and a list of references. The conclusion summarizes the main findings of the investigation and provides a final statement on the significance of the results. The references list the sources of the information used in the report.</p>
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THE MITRE RANGE, MT. WHEELER AND NAMELESS PEAKS.

From the Summit of Mt. Donkin.

From a photograph by Arthur O. Wheeler.

APPALACHIA.

VOL. X.

BOSTON, MAY, 1903.

No. 2.

Behind the Asulkan and Donkin Passes.

BY ARTHUR O. WHEELER.

IN 1902 an expedition was made under my supervision by the Canadian Topographical Survey into the back ranges of the Selkirks, for the purpose of collecting data to construct a detailed topographical map. Photographic methods were to be employed. It thus became necessary to occupy as stations the most commanding peaks, and, from their summits, to take a round of views and instrumental readings to obtain altitudes and fix the stations in position.

The ascents of high peaks previously made south of the Asulkan pass may be set forth in one short paragraph:—

In 1890 Mr. Harold W. Topham, of the English Alpine Club, and his friend, Mr. Forster, penetrated to these regions and made the first ascents of Mts. Deville, Fox, and Donkin. Later in the same year Herr Emil Huber, of the Swiss Alpine Club, accompanied by Messrs. Topham and Forster, travelled up the Beaver valley and reached the interior by that route. They climbed Mts. Sugar Loaf and Purity for the first time. In 1893 the second ascent of Mt. Fox was made by the Rev. H. P. Nichols, A. M. C., and Messrs. S. E. S. Allen and C. S. Thompson. In 1899 Professors C. E. Fay and H. C. Parker, A. M. C., first ascended Mt. Dawson (Häsler peak). In 1901 the second ascent of this peak was made by Mr. B. S. Comstock. In 1902 the Rev. J. C. Hurdman made the first ascent of Mt. Macoun. That is apparently all that are on record; not a very heavy list for thirteen years, the period between the first and last climbs referred to.

Visitors to Glacier House, B. C., the tourist headquarters for the high peaks of the Selkirks, are more or less acquainted with the topographical formation surrounding the Rogers pass. To the south are the snowy lines of the Illecillewaet and Asulkan névés, separated by intervening rock crests. The former, on the east, topples its surplus snow and ice into the Beaver valley by many a glacial outlet. The latter, on the west, is bounded by the long line of battlements beginning with Mt. Abbott and ending in Castor and Pollux. Still further west the black, precipitous escarpment of Mt. Bonney, topped by overhanging snow cornices, blocks the view.

Through this formidable barricade lie three roads to the still more formidable formations beyond its skyline. The eastern path entails a climb of over four thousand feet to the Illecillewaet névé; then a long tedious tramp, particularly so if the snow be soft, over the névé to the Geikie glacier; and finally the descent of this glacier to the main source of Fish creek (Incomappleux river). The western path is easier but more circuitous. It necessitates an ascent of Mt. Abbott, a traverse of the western slopes on Mt. Afton and the Rampart to the Lily col, and a descent by the Swanzy glacier to the stream named above. The central path by the Asulkan snow pass is best and most direct. A well-beaten trail takes you to the ice crest of the glacier, from which point an easy tramp up the ice and snowfield above leads to the summit of the pass. It is practically one long gradient of some five miles, rising in that distance 3600 feet, with but two steep bits throughout its length. The elevation above sea-level of the railway at the hotel is 4093 feet, and that of the pass 7700 feet.

You now gaze upon a scene of wild and imposing grandeur. Worming its way, two thousand eight hundred feet below, the Geikie glacier drains the south slopes of the Illecillewaet névé. Beyond, to the left, rises Mt. Fox, its blunt summit clad with snow and its northern face adorned by hanging glaciers; on the west and south sides a field of snow is seen rising to the rocks below the crest. Again beyond, the long uneven outline of Mt. Dawson is wrapped in clouds. Still further to the left, the white summit of Deville appears now and again. To the right the sharp peak of Donkin stands alone. Between it and the ragged

ridge of Dawson lies the Donkin pass at an altitude of 8559 feet. It is a snow pass, evidently presenting greater difficulties than the Asulkan. About a mile this side of the Donkin pass summit, the Dawson and Donkin glaciers flow together, and then joined flow for nearly another mile, until, like a green sluggish reptile, it buries its nose in the lateral moraine of the Geikie glacier. On either hand, symmetrical lateral moraines mark by well-defined embankments the flow of the glacier.

The descent from the summit of the Asulkan pass, for the first half, lies over snow, shale, and grassland, the last abounding in many specimens of most beautiful Alpine flora. The latter half is much steeper; sharp rock edges project, and care must be employed. By swinging to the left into a couloir, soon after this section is encountered, an easy descent is made directly to the ice of the Geikie glacier below. During the early part of the season the snow lying in the couloir materially aids the descent.

The Geikie glacier is crossed without difficulty. It is much crevassed, but the general surface here is flat. The distance does not exceed a quarter of a mile.

Over a lateral moraine and up the crest of the eastern Dawson moraine leads to a little grassy, rock-strewn flat. It is eight hundred feet above the ice of the Geikie glacier, and is an ideal spot for a camp ground. Here a cabin might advantageously be built for the accommodation of those who would climb the surrounding peaks. The scenery is wild and rugged in the extreme. The frequent tramping of mountain goats has worn a well-marked path along the Dawson moraine close by, and several flocks, marching in single file along the crest, were seen during our stay. The shrill note of the "whistler" (the hoary marmot) resounds from crag to crag throughout the day, and the tiny picas, or little chief hares, sat in rings around the camp and squeaked incessantly. They resemble much a toy rabbit and squeak like one. All along their little paths could be seen bundles of grass and flowers laid out to be sun-cured for winter use. The south slopes of the Asulkan pass and the Dawson moraines afford a paradise for botanists. Four different species of fern were found on the latter, among them the maiden-hair of lower altitudes, or one very similar. Wood is plentiful,

both for purposes of building and for fuel, and two small streams flow from snow deposits between the Dawson moraine and the slopes of Mt. Fox.

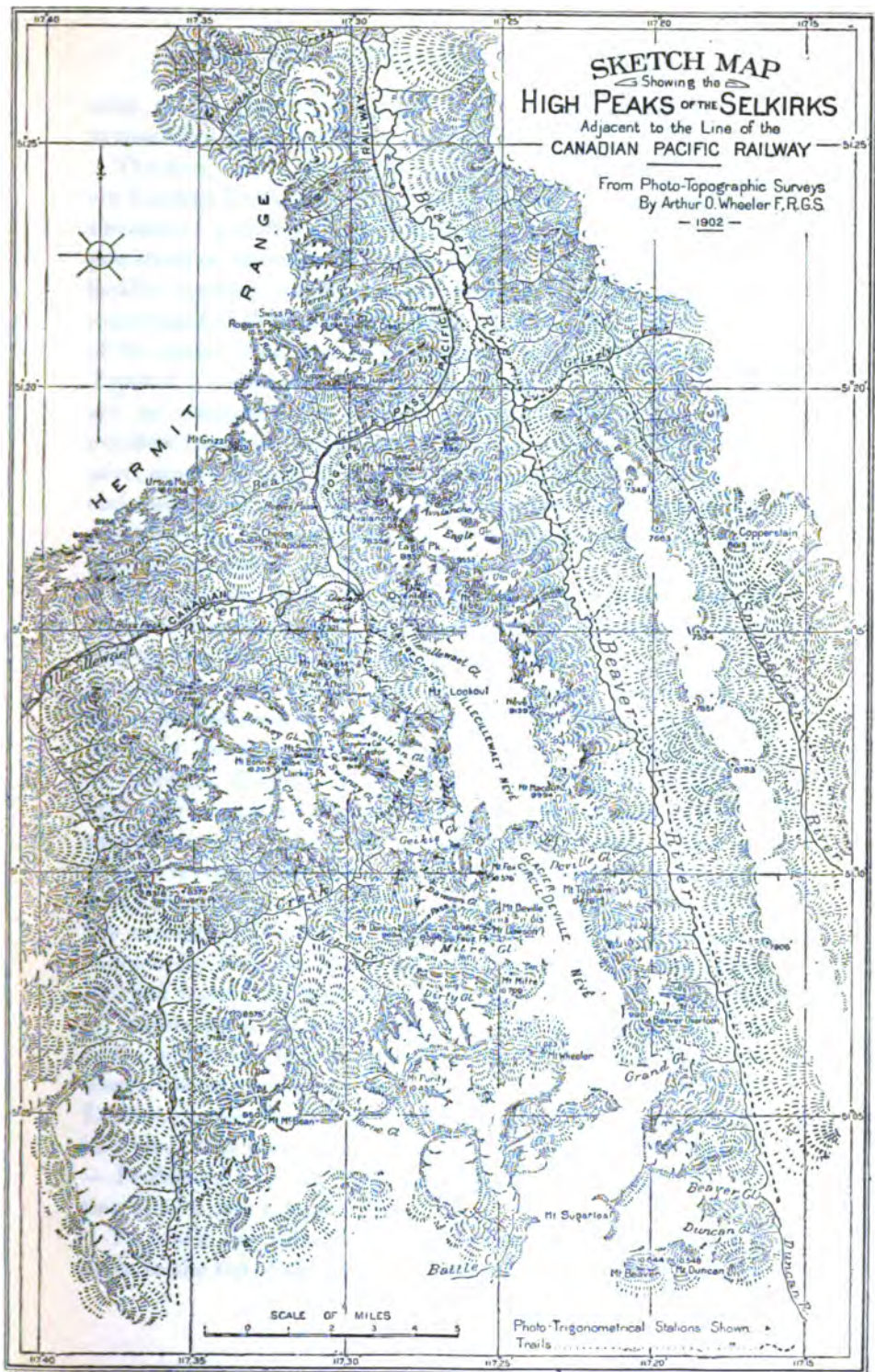
From a cabin so situated, five important climbs can readily be made: Mt. Dawson (11,113 feet), the highest peak of the Selkirks yet determined, Mt. Deville¹ (11,013 feet), Mt. Fox (10,576 feet), Mt. Donkin (9694 feet), and Mt. Macoun (9994 feet). There are, also, numerous climbs of great interest to points of lower altitude, commanding wondrous views of vast extending snow-covered ranges.

Immediately above the camp to the east is a long shoulder reaching northward from Mt. Fox. On it, near the end, may be seen a group of fantastic rock shapes, which I have named "The Witch Tower." Across the Dawson glacier is another long shoulder extending from Mt. Donkin. At the northerly corner, a station was established. The view contributed of Fish Creek valley, Geikie creek, and the topography in that direction renders the climb worthy of accomplishment.

To reach Mts. Dawson, Deville and Fox, the right moraine of the Dawson glacier is followed for about a mile. Near the end of that distance, the moraine curves to the left and soon vanishes in overlying snow slopes. The end wall of the Dawson amphitheatre now comes in view. Halfway to it the snow slopes, which are easily traversed, expand upwards and afford an opening to reach the snowfield below the final rock ascent to the summit of Mt. Fox. The ascent by this route takes about three hours from the camp ground by the Dawson moraine, and presents no difficulties other than the exertions of the climb, for which the view amply repays.

An entirely new panorama now meets the eye: the south side of the Asulkan pass, the far end of the Illecillewaet névé, Mt. Macoun and Glacier Circle below; beyond, the Beaver valley, Bald mountain and the Dog-tooth range; at our feet on one side the Geikie glacier, and on the other the Deville glacier and its névé stretching southerly to the Grand glaciers; westerly reach the vistas of the Fish Creek valley, while beyond the lower

¹ There is a "Mt. Deville" in the Rockies, which, it is understood, has been confirmed by the Geographic Board. Consequently the name is here used pending the adoption of an acceptable substitute. The same is true of "Mt. Mitre."



crest of the Dawson ridge may be seen a beautiful peak of symmetrical shape and snow outline, Mt. Purity.

The rock wall at the end of the Dawson amphitheatre is some six hundred feet in height. It is a simple climb, and except in the case of a novice a rope is unnecessary. Arrived at the top you stand on the edge of Glacier Circle. It is a most beautiful locality, opening from the Beaver valley through the great eastern escarpment of the Selkirks summit. As sentinels on either hand of the portal stand the massive structures of Mts. Macoun and Topham, grim guardians of the enchanted circle. All around are ice cascades: the Deville glacier, the Fox glacier, the overflow from the Geikie glacier and that from the Illecillewaet névé, separated only by the rocky limbs of the giants who have their homes within. Below are alpine park lands, dotted with gently waving spruce, and emerald ponds reflecting the many passing shadows of the fleecy clouds.

From the end wall of the amphitheatre a long arête, chiefly of snow, reaches upward, terminating in a shale-topped elevation midway between Mts. Dawson and Deville. To ascend the former, you turn to the right before reaching the summit of the point referred to, traverse an elevated snow plateau and arrive at the bergschrund along the base of the easterly peak of Dawson. The amount of difficulty here encountered depends upon the condition of the schrund. In any case it is well to assume the rope. An exciting rock climb, a traverse across the face of several snow slides, which descend over three thousand feet, almost sheer, to the Mitre glacier below, and you stand on the summit of Häsler peak (11,113 feet). Westerly, across a sharp arête rises the lower peak of Mt. Dawson, — Feuz peak (10,982 feet). Its highest point is 1875 feet distant from that of Häsler peak. To the south, east, and west all is clear, but to the north the view is somewhat cut off by heavy snow cornices. Beware how you climb on these! It is a long way to the Dawson glacier below and the road is steep! We found here in a glass flask the names of those who had made the first ascent, — Professors Fay and Parker and the two Swiss guides, Christian Häsler and Edouard Feuz.

To reach the summit of Mt. Deville, you continue up the arête to the top of the middle point of elevation; you then cross

a sharp snow arête, where the rope should be used, traverse the southern face of the peak, and ascend over broken rock, shale and snow slides to the crest. The cairn erected by Mr. Topham is still intact. Either Dawson or Deville may be reached from the Dawson camp in five hours, and both can be visited in one day.

From the summits of Mts. Dawson and Deville, two of the highest peaks, you gaze north, south and west upon the snow world of the Selkirks. You are at the centre of the wildest, grandest and most interesting portion of the range. On all sides flow rivers of ice. Huge glacial confluent topplers their surplus masses from every gorge. Snow-clad peaks are around you. Everywhere the irresistible forces of heat and cold are apparent, and the region may well be looked upon as one of the factories of the world. Here is a lesson to be learned: the lofty Selkirk summits collect the moisture from densely saturated clouds floating landwards from the Pacific ocean. The moisture is deposited as snow. The snow is compacted into ice in the form of glaciers. The warm summer sun melts the ice, which outflow is discharged as muddy glacial torrents carrying rocks, stones and other detritus in its headlong, impetuous course. Each valley, gulch and waterway adds its contribution to the parent stream, which eventually becomes a broad, even-flowing river, like a good-natured giant, peaceable but irresistible. By this time the detritus has been ground to sediment and is finally deposited as rich alluvial soil to fertilize tracts hundreds — ay, thousands — of miles distant from its origin. These tracts produce succulent grasses, grain, fruits, vegetables of the finest quality, and noble forests, and so provide nutriment and industry to the inhabitants of the earth. Thus the two vital forces of the world's structural economy, so prominently displayed in remote mountain districts, are shown to be the cause, by a process of evolution, of gentler beauties of landscape met with in more thickly populated and better civilized parts of the globe.

For two weeks it snowed and rained nearly every day, although only August, and clouds hid the landscape from view. In time, however, ascents were made of Mts. Dawson, Deville, and Fox. In the two first-named climbs the weather was all



MT. WHEELER (11023 feet), FROM MT. PURITY.

FEUZ PEAK

HÄBLER PEAK

MT. DEVILLE



THE DAWSON RIDGE, FROM "MITRE, WEST."

From photographs by Arthur O. Wheeler.

that could be desired. In the last case the ascent was made three times before the requisite views could be had. At the first attempt the day turned black, cloudy and very cold; at the second the peak was persistently in the clouds, and white florescent hoar frost gathered on the rocks and any external rough surface exposed to the atmosphere. The third day was bright and summer-like.

To reach the Donkin pass (8556 feet), you follow the Dawson right moraine from the camp ground referred to for about three quarters of a mile, then cross the Dawson glacier to the western edge, where it is intersected by one of the drainage lines of the Donkin glacier. It is now easy to ascend the snow-field above the icefall, keeping in the centre of the main depression. Care is required for a first trip, and it is wise to use a rope until accustomed to the route. There are a number of crevasses to be avoided and a few snow bridges to be crossed, but nothing of difficulty until you reach the bergschrund at the head of the pass. Beyond the schrund rises a nearly perpendicular ice wall, a hundred feet or more in height. The top is surmounted by cornices. Rather than attempt this, it is better to swing to the left and ascend the snow and rock slopes in that direction. Even here considerable care is required, owing to underlying ice. The latter route carries you about a hundred feet above the summit of the pass, but the descent to it is simple.

From the summit of the pass a most striking view is presented: a little west of south, across two tributaries flowing to Geikie creek, rise the glistening white slopes of Mt. Purity (10,457 feet). It terminates a snow-clad range, rising at its eastern extremity in a snow peak of considerably greater elevation than Mt. Purity itself. The view is then closed by the ragged rock-ridge culminating in the double-pointed peak christened Mt. Mitre by Topham. Between this ridge and that of Dawson flows the Mitre glacier. It is very similar in appearance to the lower portion of the Geikie glacier, in that there are no icefalls; and from the height of the pass it looks to be one even slope, the crevasses showing like black contour lines.

To the left of the pass, a rock arête rises to the third and lowest prominent peak of the Dawson ridge; it has been named "Michel peak" (10,084 feet), after Friedrich Michel, the guide

who was with the party beyond the Donkin pass for part of the time. He was the first guide to ascend Mts. Donkin and Purity. To the right a long and broken arête, part rock, part snow, leads to the summit of Mt. Donkin (9694 feet). The cairn built by Messrs. Topham and Foster in 1890 is still standing. There is little difficulty in the climb, and the view from the isolated peak is sublime. Of particular interest are the southerly slopes of Mts. Swanzy and Bonney and their respective lines of drainage, the Swanzy and Clarke glaciers; also the valley of Fish creek and its branches, the Flat Creek pass and the long array of snow peaks, snowfields and glaciers lining these streams on the west. The summit of Donkin may be reached from the Dawson camp in three and a half hours if the snow is in good condition.

From the crest of the Donkin pass to the foot of the Mitre glacier, the descent is only 1600 feet. It lies over shale slopes above and grasslands below. Crossing the northerly stream, which drains the Mitre glacier, a traverse brings you to an immense rock-slide. It reaches directly from the crest of the opposite ridge, an extension of the Mitre ridge, right down to the forest, upon which it has made a considerable inroad. Near the foot of the slide camp was pitched on a spot leveled beneath some spreading spruce. At our feet was a limpid pool. It was a lovely spot and a most luxurious camp-ground: fuel everywhere, water almost in reach, and pine boughs — oh, what pine boughs! Even the thought that on the morrow we were to ascend Mt. Purity did not keep us awake.

Breakfast at three A. M. by firelight, on the march the moment we could see where to place our feet. Down through thick, matted timber, a thousand feet. Across a glacial torrent¹ and up a moraine. Then a glacier (A) had to be negotiated. Some more moraine-climbing, a traverse around a rocky ridge, a stretch of grassy plateau, then another traverse on a belt of snow below a row of frowning cliffs (B) and we stood at the foot of the long steep slopes of snow (C) leading to the summit of the mountain.

Here we rested and munched some chocolate. Now, or never! Slowly we rise, kicking toe holes in the hard snow, till we are a

¹ The general line of ascent is indicated by the letters and arrowheads in Plate XVI.



MT. PURITY AND MOUNTAINS BEYOND FISH CREEK.

From photographs by Arthur O. Wheeler.

thousand feet above the rocks. Excitement urges us on. We feel no fatigue. A moment for breath here and there, and at it again. The top is in sight. "Excelsior! Excelsior!" We reach the summit. We are standing beside the cairn erected in 1890 by Messrs. Huber, Topham and Forster. We are wild with excitement and exhilaration. We clasp each others' hands, we shout, we laugh. The feeling is that of intoxication. It is akin to victory on the field of battle. There is little doubt that the feeling of conquest is the true secret of the intense attraction of mountain climbing. It had taken two and a half hours of most fatiguing work to conquer that final snow slope.

Mt. Purity is 10,457 feet above sea-level. In their map of the district, Messrs. Huber and Topham show it as only 9090 feet. The view from the summit cannot be surpassed: glistening snow peaks and snowfields are all around; far below wind serpentine ice rivers, still unnamed; every crack and gulch holds its glacier; here and there, jagged rock peaks rise from their snow mantles only to bury their crests in the clouds. Immediately below to the south, on the left of a snow plateau, is the amphitheatre of the source of Battle creek, a large tributary to Fish creek; to the right is that of Horne creek, generally supposed to be the main source of Fish creek. (This, however, is not the case, as the largest flow comes from the Geikie glacier.) Far away to the south is the deep depression of the Arrow lakes and the noticeably lower, heavily timbered mountains of the Kootenay country. Westerly, beyond the Fish Creek valley, which can be traced by its deep depression filled with violet haze almost to the northeast arm of Upper Arrow lake, lie more snow peaks, extensive snowfields and huge glaciers. Northward, in the distance, are the south faces of the high peaks along the railway, — Bonney, Swanzy and Sir Donald; and nearer at hand, the ragged black precipices of the Dawson and Mitre ranges. To the east, across the head of Battle creek, is one snow-clad summit, higher than all others in the group of which it forms the keynote. This was assumed to be Mt. Sugar Loaf, and it was decided to make the ascent if it could be reached from our present camp. Beyond, in the far southeast, one peak rises prominently, towering above its surroundings. It appeared to be on the west side of the Columbia river, and in all probability is the Mt. Nelson of David Thompson.

The snow slopes of Mt. Purity were descended by a series of very steep glissades. It had taken two and a half hours to climb these slopes; it took, including stops, twelve minutes to descend. The time of ascent from the camp to the summit was four and a half hours.

The following morning, we again rose at three A. M. and started to find the whereabouts of the high eastern peak seen from Mt. Purity. The route lay along the south side of the Mitre glacier. Excepting a few ice slopes to be scaled and some crevasses to be avoided, the highest part of the snowfield above the glacier was reached without difficulty. It lay between the rock walls of Mts. Deville on the north and Mitre on the south. From here it slopes to the Deville glacier. Rounding the corner to the south and ascending slightly, we were on the Deville névé. It stretched before us in dazzling purity for three miles, a nearly level sheet of snow. On the left a series of rock points, similar to those along the Illecillewaet névé, marked the line of the precipitous eastern escarpment of the summit range above the Beaver valley. To the right a deep bay led over a height of snow to the "Dirty glacier" (so called by Messrs. Huber and Topham) between Mt. Mitre and the line of snow-clad summits lying between Mt. Purity and the peak we had in view. On the south side of the bay a long shoulder projected from the peak into the Deville snowfield.

An ascent was first attempted by this shoulder, but on reaching the crest of the arête with some difficulty and danger, it was found to be very narrow, of ice and much corniced. It was necessary to obtain the earliest possible light for photographing and speed was most important, so it was reluctantly decided to descend again and attempt a route by the deep bay previously mentioned. A series of snow slopes with one narrow snow arête led to the summit, a somewhat tedious and laborious work. We arrived at twelve o'clock, and were well repaid by the glorious view around us.

In addition to all we had seen from Mt. Purity, the eye now ranged beyond the Beaver valley; across the plateaus of Bald mountain; across the wide shadow valley of the Spillimacheen river, interspersed with shining ponds and golden meadows; across the brown rock-frayed summits of the Dog-tooth range

to the massifs of the Rockies, showing clear and sharply cut till lost in the distant haze. To the south, not far distant, could be seen Mts. Beaver and Duncan, the former easily recognized by its sharp horn. Across the Deville *névé* at its southeast corner was a high pointed peak, overhanging the Beaver valley. This we proposed to visit, as it would make an excellent station from which to map the source of the Beaver river.

There was no sign of previous occupation of the peak on which we stood, and from its position, it soon became apparent that it was not Mt. Sugar Loaf, as had been surmised. The altitude is 11,023 feet.

On the way back to camp an accident nearly occurred. We were descending the Mitre glacier, some distance from the sides, and were threading our way among the crevasses, when a shout behind caused the leaders to turn quickly round. No one was to be seen. My assistant had apparently vanished from the face of the earth. A second shout drew attention to the brim of a hat and an arm appearing above the edge of a crevasse. He had broken through the snow, fortunately catching his ice-axe on the opposite edges of the ice. The pit apparently led to the centre of gravity, for we could perceive no bottom. It was a lucky escape.

Next day one of the westerly points of the Mitre ridge was occupied at an altitude of 9289 feet. It was a nice little climb, and led to an excellent photographic station for topographical purposes. Mt. Mitre was so named by Mr. Topham. Seen from the summit of Mt. Donkin, the two central points strongly resemble an episcopal mitre. I could discover no other resemblance than this. The higher of the two points is 10,709 feet and the lower 10,649 feet above sea-level.

On the day following we were up at four A. M. and made our final climb in this district. The route along the south side of the Mitre glacier was again followed to the Deville *névé*. Here, instead of keeping to the right, we struck to the left, and shortly after ten o'clock reached the high point marked down from the peak across the *névé*. It was an easy climb — long slopes of snow rising directly to the peak.

Speaking topographically, the view from the summit is excellent. It sweeps the Beaver valley from its source to within

a few miles of its mouth, and shows, far below in the distance, the snout of the glacier from which the stream first flows. At our feet, southward, lay the Grand glaciers — gigantic piles of broken ice falling from two separate sources, almost meeting and then flowing side by side, separated only by a well-marked medial moraine. On the further side rose the white snow slopes of Mt. Sugar Loaf, and a little to the left the masses of Mts. Beaver and Duncan, each at the head of the glaciers forming respectively the sources of the Beaver and Duncan rivers. The beautiful grandeur of these white peaks, rising on all sides as far as the eye can reach southward, fills the observer with awe and wonder, as well as with admiration at the soft, gently shaded snow mounds piled one on the other in bewildering confusion.

We named the station "Beaver Overlook;" the altitude is 9900 feet. The entire panorama of Bald mountain lay to the east across the Beaver valley, and from our exalted position we planned an expedition to the plateaus and park lands before us, in order to map the great rock escarpment of the summit range. Later, the plan was faithfully carried into execution.

The following day camp was struck and instruments and outfit packed over the Donkin pass to the supply camp by the Dawson moraine. Shortly after starting we came upon an old camp-ground in a grove, not far below the foot of the Mitre glacier and about half a mile from our own camp-ground. Numerous articles lay around: an iron tea pail, a frypan, several tins of Armour's corned beef, a tin of beef extract, cartridge shells and other articles. Speculation was rife as to who had been camped there, the general opinion favoring the suggestion of prospectors. The question was settled by finding, tied up in cotton, a package of rusted Swiss edge-nails for climbing-boots. It left little doubt that the camp-ground had last been occupied by Messrs. Huber, Topham and Forster in 1890. We all secured relics, and among others one of the cans of corned beef, which we ate for supper that evening. Although it had been lying under the summer suns and winter snows for twelve years, the contents were as good as the day they were first put up, and were much appreciated as a change from salt fare.

In that week of the most beautiful weather of the whole



Plate XVII.

THE GRAND GLACIERS, FROM BEAVER OVERLOOK.

From photographs by Arthur O. Wheeler.



summer, we had packed a camp and instruments over the Donkin pass, made five climbs, the highest 11,023 feet and the lowest 9289 feet in altitude, and again packed the outfit over the pass.

The altitudes here given are derived from a series of trigonometrical levels, comprising angular readings of elevation and depression to and from surrounding stations already established, duly corrected for curvature and refraction. They are not far from the truth.

It is not likely that much will be done in this vicinity until a habitable cabin is built by the Dawson moraine. It will be well when greater facilities are furnished in this respect, for the character of the climbs and the panoramas of snow peaks displayed from the various summits in billowy profusion are away and beyond anything that can be seen around the Rogers pass from an alpinist's point of view. With such a headquarters to fall back upon, by carrying a light tent, blankets and provisions, expeditions can be carried beyond the Donkin pass in any required direction.

Mount Whitney, California.

By WILLIAM HALLOCK.

Read March 20, 1903.

THE Appalachian system of mountains extends along the Atlantic coast, rising in general altitude toward the south until it culminates in the higher peaks of the Carolinas and falls off rather abruptly to the lowlands near the Gulf. In a manner entirely analogous the range of the Sierra Nevada skirts along not far from the Pacific, forming the backbone of the State of California. Although the peaks east of San Francisco are by no means insignificant, still passing the Yosemite valley, King's river, and the rest, the bald and serrate ridges rise higher and higher toward the south, until that unparalleled group of peaks is reached, which forms the head walls and divides of the King and Kern rivers on the west, and the valley of the Owen's on the east. Here are assembled a family of giants, who rear their heads in bald and solemn grandeur nearly three miles above the level of the sea. Standing somewhat aloof from the rest, on

the south of the cluster of Titans, is Mt. Whitney, the highest and grandest of them all. Farther to the south the range falls rapidly and is soon lost in the Mohave desert. What Washington is to the hills of New Hampshire, such is Whitney to the giant peaks of California.

Our lucky little party, under the conduct of Mr. Harrington Putnam, left the Santa Fé Railroad at Visalia, California, and owing to the kindness of the officials we were received by the people of that town with genuine hospitality.

A very dusty ride across the valley of the San Joaquin brought us to the foothills of the Sierras, where the Kaweah river breaks out upon the plain. From this point a charming stage ride up the Kaweah and its North and Marble forks brought us into the heart of the Sierras, where peak towers above peak, and the valleys that lie between seem but lines drawn to prevent the peaks from climbing upon each other and lifting their jagged heads still higher.

On the Marble fork of the Kaweah is the Sequoia National Park, where are set apart — fit companions for such mountains! — those living giants whose past reaches far back of Rome and Greece, and whose tongue, if loosened, could tell a tale longer than our whole known history.

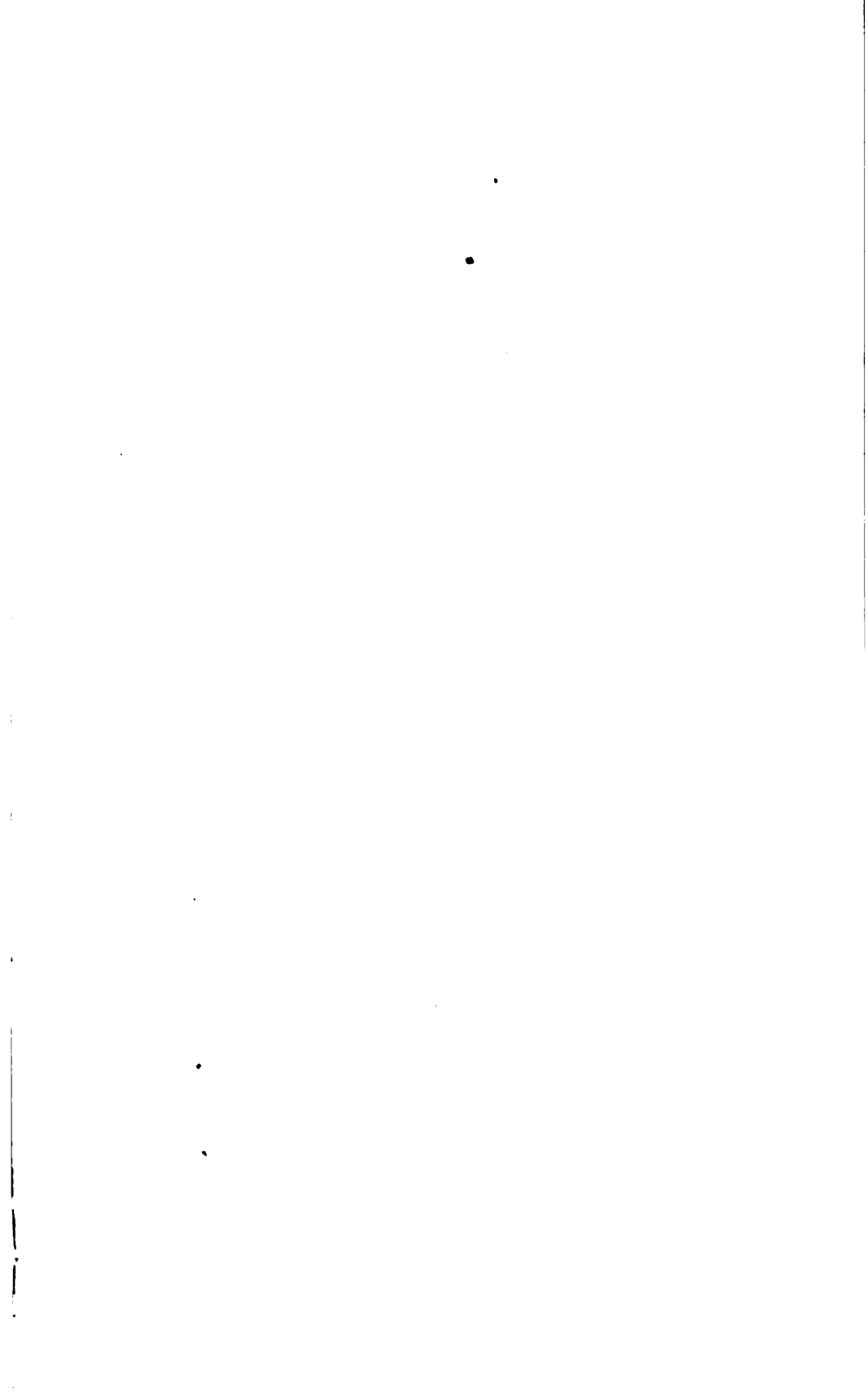
Leaving the park with our own pack train we plunge into the maelstrom of peaks and cañons, one moment skirting the edge of a deep gorge to cross some saddle, only to find ourselves in danger of dropping into another valley, more precipitous, more grandly fascinating than the last. Now at an altitude of ten thousand feet, circling the head wall of some abyss, with a ridge three thousand feet above our heads; now plunging down the side of Buck cañon, taking strides that would have done credit to seven-league boots, raising clouds of fine, impalpable dust, only to climb with slow and snail-like step the opposite wall. Thus went the march, over ridges and across streams, — the forks of the Kaweah, Cliff creek, and Deer creek, — until we stood on Timber Gap, looking down upon the deserted mining camp of Mineral King, nearly two thousand feet below. As now the eye wanders on beyond those pygmy evidences of the transitory and insignificant nature of human deeds, the trail is visible, first as a road, then as a path, then lost in the distance where



THE EASTERN FRONT OF HIGHEST WHITNEY.



MT. WHITNEY FROM THE EAST, UP LONE PINE CAÑON.





THE SUMMIT OF MT. WHITNEY.
From a photograph.

we must clamber up to Farewell Gap, a thousand feet above our present station. This view of the valley at our feet shut in by the giant walls on either side, with the grand and lofty gateway at the other end, forms a picture that will ever stand out sublimely beautiful, even amid such a host of unique associates.

Over Farewell Gap, and again the same up and down, the same broad expanse of panorama. Down a thousand feet only to climb it all again, over Coyote pass, then that incomparable walk along the banks of Coyote creek, where the trout are so sociable that they come out to watch the passer-by, like the idle housewife. But alas! so happy, so unconcerned were we that we never missed the lone mule, who evidently preferred the solitude of the mountains to our company. Inasmuch as this particular pack mule carried the essentials of our supper, we were compelled to satisfy the cravings of the inner man, after a hard day's walk, with raw onions, tea in a can, without milk or sugar, and crackers, while poor Blossom, our packer, climbed up that cañon wall in search of the miscreant.

Crossing the Kern river at the upper lakes we followed up what is now called Whitney creek; properly should it be called Volcano creek, as in its valley is a most interesting flow of lava, that seems but of yesterday, and yet must be centuries old. We shall not soon forget the walk over those old lava beds, lying jagged and rough, and compelling us to leap from block to block. Then more saddles, more grand valleys and cañons, more following to the head wall of one creek only to drop down another on the other side, up and down, up and down; marvelling at the grandeur and beauties of the landscape by day, and sleeping at night with the vault of heaven as our canopy, dotted with stars which in that pure rare atmosphere seemed but a few feet from our eyes, and many times more bright and numerous than in lower levels, by the sea.

At last, after more than a week of the grandest, most exhausting walking of our lives, we arrive at the upper meadow on Whitney creek (now called "Crabtree"), and behold there it stands, proudly turning its back upon us, as if ashamed that such pygmies were to be allowed to trample upon its head,—Mt. Whitney! Bald, bare, ragged and rocky, devoid of all vegetation, yet warm and pleasing withal, it stood revealed in the clear sunshine of the afternoon.

We left camp at five in the morning, not so much perhaps for any other reason as that the "Conductor" had tried a patent scheme on his bed arrangement that night, and as it proved a dismal failure we were routed out early. Following up the creek, winding here and there, we made our way between the walls and boulders of granite, polished by the handiwork of the giant glaciers of the past. The trees become smaller and smaller, retreating from an open fight with the elements, to seek help and protection in sheltered nooks, until finally even the bravest can no longer hold out. Here and there a little patch of short grass is still able to lend a touch of color to the expanse of limitless rock, and if one looks closely he will find a beautiful little fringed gentian hiding away in the grass, the whole plant not more than three inches high, and yet as perfect and as attractive as its larger cousins in lower spheres. Suddenly, at the round of a bold bluff, we come in sight of Guitar lake, an exquisite bit of emerald in granite setting. Here are still the piers on which Langley set his instruments in his classic investigation of the color of the sun.

The elevation of this lake is 11,625 feet. At this point begins the real climb of the mountain; over talus of large and small boulders and blocks dumped in utter confusion we scramble up eight hundred feet to the bottom of the "chimney."

The "chimney" well deserves its name, being a narrow crack, or slit, between rocky walls, where all the skill and strength of the climber is needed to clamber up its five hundred feet. This strait once passed, all is clear sailing, and fifteen hundred feet of a climb that is not dangerous or difficult, but just one long strong pull, brings us to the ridge which is near the top, and which drops off so suddenly to the east that one feels inclined to back up a few steps lest he may blow over. Following the crest of this ridge a half mile around to the northeast, over huge granite slabs, weathered into rounded forms, with the crystals of the harder constituents standing out in high relief, we soon reach the top of the United States, and standing beside the little monument we try to realize that we are on the highest point between the confines of Canada on the north, and Mexico on the south. Nor is it difficult to bring ourselves to an adequate conception of this fact, for at our feet, within a step, yawns an

abyss such as might have confronted Dante on the confines of Dis. Spread out before us is the valley of the Owen's river and Owen's lake, but so far, far below that it seems as if we had been suddenly transported to the clouds, and were looking back at old Earth from unexplored aerial heights. Gradually the eye becomes accommodated to the conditions, and we can distinguish first the lake, lying only a few miles distant as the crow flies but two miles below us. Tracing down a grand cañon that seems to start from some point far beneath our feet we locate Lone Pine, and farther around to the northeast is the larger town of Independence, distant seventeen miles, but 10,600 feet below our lofty pinnacle. After gazing into these depths until the head swims, one turns with relief to the north and west and south, where are spread out a panorama of mountains and cañons unexcelled in any country.

Our nearest neighbor on the south is Sheep Mountain (otherwise called Old Mt. Whitney and King's Pique), 14,100 feet, and beyond this the mountains fall off rapidly into the Mohave Desert, to rise again in the distant range of San Bernardino. Off to the south-southwest we see the old friends around Farewell Gap, and above Mineral King, towards the southwest rises that matchless range of serrate peaks which divides the Kaweah from the Kern cañon, and rising higher and higher toward the west culminates in Kaweah Peak, 14,140; this in turn is joined on the northwest to Table Mountain, 14,000, and Mt. Brewer, 13,880 feet, which form the outposts of that cluster of giant peaks which stand guard over the head-waters of the King's and Kern rivers. To name them would take too much space, and their altitudes mean but little. Among the Titan company are Keith, 14,120, Junction, 14,000; Leland Stanford University, 14,100; California University, 13,950; Gould, 13,320; Gardner, 13,200; King, 13,200; South Palisade, 14,000; North Palisade, 14,275; Tyndall, 14,100; Williamson, 14,450, — the latter almost due north from Whitney and only five or six miles distant.

Across Owen's valley to the northeast is the Inyo range, running south into the Panamint range in the southeast, enclosing Death valley. Thus are the highest and lowest altitudes of our country within a short distance of each other, the

one 14,550 feet above and the other 280 below the level of the sea.

Reluctantly tearing ourselves from a view so grand and engrossing, we proceed to make a few observations. Hunting out a sheltered nook among huge granite blocks, we set up our little boiling-point apparatus and light our candle. In a few moments the steam is coming out, and in five minutes we can commence our readings at $186^{\circ}.39$ Fahrenheit. Gradually the temperature becomes constant, or but slightly fluctuating; a series of readings gives a mean of $186^{\circ}.47$.¹ In fifteen minutes all is over, and the apparatus is again packed in its case, $2 \times 9 \times 3\frac{1}{2}$ inches. Of course the aneroids were read, and of course reported much too high, — three hundred feet.

¹ From the tables published by the Smithsonian Institution it is possible to convert a boiling point into its equivalent barometric pressure, which may then be used as the reading of a standard barometer.

The complete formula for the determination of the difference in altitude from the differences in barometric pressure as given by Bigelow¹ in the Weather Bureau Report for 1898-9 (page 490) is —

$H - H_0 = 60367.7 [1 + .002039 (\theta - 32)] (1 + .378 \frac{e}{B}) (1 + .0026 \cos 2\phi)$
 $(1 + \frac{H+H_0}{20899600}) (1 + .00157) \log \frac{B_0}{B}$, in which H = height of boiling-point station in feet; H_0 = height of base station in feet; θ = mean temp. (F.) of the air at the top and bottom; e = tension of water vapor in feet at the point where the barometer (B) is read; ϕ = the latitude of the locality; B_0 = reading of the barometer at the base station; B = reading of the barometer at the top of the mountain.

The Weather Bureau at Washington kindly furnished me with all the records from their station at Independence, Cal. — my base station.

Substituting in the determination of the altitude of Mt. Whitney the values $H_0 = 3910$ (altitude of Independence); $\theta = 60^{\circ}$; $e = .110$ feet; $B_0 = 25.93$ inches; $B = 17.70$ inches; $\phi = 36^{\circ}.38'$: we have $H - 3910 = 60367.7 \times 1.05710 \times 1.00160 \times 1.00075 \times 1.00088 \times 1.00157 \times .165829$; adding 5 feet for the difference between the actual point at which the observation was made and the actual summit, we have $H = 10633 + 3910 + 5 = 14,548$ feet.

The value obtained by Langley was 14,522 feet. When it is borne in mind that an error of .01 of a degree Fahrenheit in the boiling point corresponds to an error of about .01 of an inch in the barometer and to about 20 feet of elevation, it will be seen that the agreement is quite satisfactory, and that the boiling-point apparatus is a light and convenient substitute for the bulky and troublesome mercurial barometer.

It may not be possible in all cases to obtain a good determination of the boiling point on the top of all peaks, but it is surely possible at a point not more than a few hundred feet below the top, and the aneroid can be depended on for the measurement of such small differences in altitude.

¹ Another similar formula will be found in the Report of Professor S. P. Langley, Professional Papers of the Signal Service, No. XV., page 190, where will also be found a very full and interesting discussion of the subject.

The compass bearings of various conspicuous peaks were taken and a number of photographic exposures made, and then we were free to yield ourselves again to the intoxication of that grandest of panoramas. Gradually each peak and cañon was searched out, and many were the exclamations of delight and the calls to come and look at this or that new pinnacle or gorge. Everywhere the warm pinkish gray of the granite tempered even to beauty the barrenness or bleakness which one might expect in such an ocean of rocks, devoid of any trace of living thing. Everywhere were seen the little glacial lakes nestling at the feet of beetling crags, or filling the bottom of some giant amphitheatre, like matchless sapphires and emeralds.

Reluctantly we turn from that unique spot and slowly stroll back toward the descent, but not until we have stood for a few moments upon one of the side pinnacles and looked back at that noble head, reared against the centuries. From here we see that, from the little monument which marks the top, the front of the mountain breaks off in a series of irregular terraces of rock for a few hundred feet, only to fall sheer into unseen depths. We know that wall to be some three or four thousand feet in perpendicular height.

All mortal joys must end, and so we finally find ourselves again at our meadow camp, to take up the homeward trail. Skirting along beneath the Whitney range we worked northward until we could get down into the head of Kern Cañon. That walk of twenty-five miles down the banks of the Kern stands out as the peaceful, beautiful quiet after the grand storm of sublimity upon Whitney. We wander beside the rushing river down the narrow gorge, now scarcely a hundred yards wide, hemmed in between tower walls that rise two and three thousand feet above our heads, yet widening a little where some side stream plunges to join the river. In the middle of the afternoon the sun has already disappeared behind the western wall, and we seem to travel on in a beautiful twilight of four or five hours. We pass the mouth of Coyote Creek, where we crossed the Kern in our outward trip, and follow the ever growing stream past the lower lakes, where an avalanche has dammed the river. Soon we must swing off to the west across the divide into the valley of the Little Kern, and make our way

up along its roaring waters until we stand once more beneath the towering sentinels at Farewell Gap. We do not enter, but turn sharp to the west, climb our last divide (10,200 feet), and camp in Cabin Meadow on the head waters of the South Fork of the Kaweah. This is our last camp, for a descent of seven thousand feet the next day takes us down to Broder's ranch, and to ripe figs and peaches, and to the civilization of lower levels. A short walk and a stage ride and we are again in Visalia after seventeen days, tired, dusty, and to outward appearance much the same as before. Nevertheless each of us bore an inward consciousness of a great change, and at night as we close our eyes, again we are upon the lofty peak, sailing through the clouds, looking down upon the pygmy affairs of Earth far beneath, as if we stood upon the prow of some world ship, plunging on our way through space.

Climbs among the Highest Canadian Rockies :

Mts. Columbia, Lyell, Bryce, and others.

BY JAMES OUTRAM.

Read November 19, 1902.

PERHAPS the chief charm of the Canadian Rockies is their boundless opportunity. The wealth of scenery is not alone of the most exquisite character, but also limitless. The peaks are not only strikingly effective, but stand ranged in serried ranks for hundreds of miles, and bearing glaciers so numerous and extensive that no region short of the Arctic circle and its outer fringe, save possibly the Himalayas, can compare with them. The fascination of the unknown is most intense, and adds enormously to the pleasure of ordinary mountaineering ; but year by year the opportunities for such enjoyment are becoming less, and the distance from a civilized base more remote. The cream of novelty is rapidly being taken off, and the chance of a lifetime will soon be irrevocably past.

Impelled by such considerations and attracted by the taste I had in 1901 of camping, exploration, and good mountaineering, on a minor scale, a more ambitious programme was prepared for the following summer. From the tops of Mt. Habel and

Mt. Collie (my "farthest north" the previous year), a distant vision was vouchsafed of several of the lofty mountains along the Continental watershed, and a nearer view of the noble pyramid of Mt. Forbes, the Freshfield group and their attendant ice-fields, which filled me with a keen desire to visit that vast mass of mountains lying between the upper waters of the North Saskatchewan, the Bush and Athabasca rivers.

The explorations and narratives of Messrs. Wilcox, Collie, Thompson and Habel, the estimates of enormous altitudes, and sundry questions of identification, which remained unsolved, assured a most interesting geographical problem, plenty of grand scenery, and probably some really first-class climbing; and preparations were made for an eight weeks' campaign.

Unfortunately my two expected comrades were both at a late date unable to make the expedition, but, happily for me, the C. P. R. had engaged Christian Kaufmann as one of their Swiss guides, and most kindly placed his services at my disposal for July and August. Otherwise the entire scheme must have been abandoned. He is one of the foremost guides in Switzerland, a magnificent rock climber and thoroughly experienced on ice and snow. A member of Mr. Whymper's quartette of famous guides, he was my companion on several occasions the year before, and probably no other would have agreed to go alone with me; for two on a rope, while grand on rocks, is rather an anxious proposition when *névé* or avalanching slopes have to be negotiated.

However, we decided not to lose so unique a chance; and on July 9 we met our "outfit" at Laggan station, and that evening joined the camp a few miles up the Bow valley. Of course Bill Peyto was in charge, but the cares of his increasing business prevented him remaining with me all the summer; so Jim Simpson and Fred Ballard undertook for us throughout the trip, and admirably did their work.

My chief objective was the West branch of the North fork of the North Saskatchewan, where I could readily strike into the very heart of the desired region, obtain a comprehensive survey of its entire system, and also, it was hoped, be able to reach Mt. Columbia, the monarch of the northern section, Mt. Forbes occupying that proud position in the southern. Three

main desires had formulated in my mind: first, to gauge fairly accurately the altitudes of the big peaks, which I felt almost certain had been very considerably overestimated; second, by striking the Divide at eight or ten new points high up, to obtain information as to the line of the watershed and the valley system on either side; and third, to find out beyond a doubt whether certain conjectures of identification were correct, particularly whether the mountain designated as "Gamma" by Mr. Habel was in reality Mt. Columbia.

This ample programme I was fortunately able to carry out successfully. Ten new peaks over 10,000 feet were conquered, almost all of them on the Divide, and three new passes were investigated; Mr. Habel's conjecture we found to be correct, Mt. Lyell's position was rectified, and the question of altitudes fairly determined. This was the only disappointment of the summer, as from 1000 to 1500 feet had to be deducted from the earlier estimates in the case of all the highest mountains, the loftiest of which are probably no more than 12,500 feet, instead of 14,000. Nevertheless they are splendid peaks, and as the valleys are almost uniformly low, especially upon the west side, an abrupt rise of 8000 feet or more is not uncommon. The structure is, as usual, limestone, extremely friable and wearing into many striking forms.

The delights of camping life in perfect weather, through magnificent country, cannot be expatiated on; nor the details of the route, which, though new to me and full of interest, has been already traversed by members of the Appalachian Club and described in these pages.

Our outfit numbered fourteen horses, at the outset, two kindly lent by Fred Stephens, who was packing in advance supplies for Professor Collie's party, who were expected ten days later. Our way lay by the Upper Bow valley, across Bow pass (nearly 2000 feet above Laggan), and down the grand narrow valley of the South fork of the Saskatchewan. On the fifth day we camped at the junction of the South fork (Bear creek) with the main Saskatchewan, at an elevation of about 4500 feet, and I spent a most delightful afternoon, wandering along the banks of the two rivers, enjoying the grand views, and looking longingly at the sharp apex of Mt. Forbes, which rose white and majestic above the rugged mass of buttresses of its huge massif.

The 14th of July was occupied in crossing Bear creek and the main river. Both fords were highly interesting to a novice in this kind of travelling. The first is one of the most objectionable imaginable under the flood conditions that then prevailed. Twenty minutes later we came to the wide, swiftly flowing Middle fork, and had considerable difficulty with the animals, as it was necessary for them to swim, and thus early in the trip the fording process was a novelty. They refused at first to follow Jim's lead, so Peyto tried, as they were used to following his trusty mare; but they declined once more, and even the mare played Peyto false for the first time on record and ducked him artistically when about halfway across. Finally Jim had to return, and eventually, by dint of drag and drive, the bunch was safely landed on the further shore. Peyto now bade us farewell and returned to Banff, whilst we forded the North fork, just escaping another swim, and camped on a knoll above the river mouth, where we spread out our possessions in the blazing sunshine to recover from the effects of our late damp experience. A charming view enhanced the excellences of an ideal camp location.

A brilliant day wore to an evening marked by marvellous storm effects of lurid light and sweeping clouds, massed like a pall of deepest purple over the black mountain forms that surrounded us, and culminated in a wild night of thunder, lightning, rain and hurricane. By morning its force was past, and though a breakfast under canvas was expedient and our start was later than the ordinary, the journey up the North fork was made in better weather, though heavy clouds still clustered round the higher summits.

A fair trail winds along the base of the impressive bastions of Mt. Wilson, several hours being required to get beyond its extensive limits. Sometimes we pass close to the swirling river, which makes a fine fall about a mile above its mouth; sometimes cutbanks demand détours amidst a maze of fallen timber or through green forest, swamps or thickets of tall willows, the latter singularly unpleasant after a saturating night of rain. Four hours that day and two upon the 16th brought us to the mouth of what is called the West branch of the North fork. To me it seems a larger stream than the so-called main river,

besides being undoubtedly of greater length, and I am of opinion that it is the true North fork, and that the supposed main stream is in reality the tributary. Forging the latter we camped in a pleasant spot upon a knoll, some thirty feet above the flats.

The weather had again been dull with heavy clouds; but as we proceeded on our way and approached the valley to the west, whither we were bound and where the bulk of our season's work was centred, far away at its head appeared a gleam of light, the only bright spot in the whole expanse of gloom, and I hailed it at once as an omen of success. Another amusing omen, pointing to a safe and successful issue to our climbing plans, in spite of the undesirable two-on-a-rope conditions, lay in the happy and convincing fact that our initials formed the cipher "O. K.," and who could dream of misadventure in the face of that?

We were now on the threshold of a practically unknown land. Mr. Wilcox had climbed a spur of Mt. Saskatchewan, in the angle of the streams, and Mr. Thompson had traversed the valley right to its head as far as Thompson pass,¹ but had made no ascents, and many details still remained uncertain or unknown, whilst all the peaks were absolutely new.

Gradually the clouds dispersed, and, after an early dinner, the outlook was so hopeful that Kaufmann and I started upwards to explore, Simpson meanwhile occupying himself with the no light task of cutting a trail for use on the morrow. Our route lay through the woods, and soon we struck a well-marked game trail, which we followed to the timberline, and advanced along the rocky ridge of Mr. Wilcox's Mt. Saskatchewan spur as far as his cairn of 1896, about 8400 feet above the sea. The view was most interesting and inspiring, — a foretaste of the good things in store for us. The billowy clouds that seemed reluctant to leave the loftier summits eventually lifted, and revealed one by one the peaks that we had come to climb, besides a host of less importance.

In the forefront was Mt. Saskatchewan, presenting to us a face absolutely precipitous, great belts of horizontal limestone stretching from end to end in splendid cliffs, and its arêtes and

¹ See APPALACHIA, Vol. IX. p. 372.



VIEWS IN THE HIGHEST CANADIAN ROCKIES.

- 1—THE TWINS, FROM COLUMBIA GLACIER. 2—MT. SASKATCHEWAN.
3—"QUERY" PEAK.

From photographs by James Outram.

outlying northern spur broken by pinnacles and needles of rock, some of them two to three hundred feet at least in height. Across the deep valley, impressive walls of the prevailing horizontal strata, crowned with an icy mass of level glacier of immense thickness, curved like a titanic amphitheatre round a huge basin filled with pure white névé, from which a crystal stream cascaded to the wooded slopes below. At our feet meandered the tortuous river, which we could trace as far as a right-angled bend, where three grand glaciers unite at the base of a fine range of peaks: and further to the right the three sharp points of Mt. Bryce loomed dark beneath the luminous masses of lifting clouds.

We were in great perplexity as to the identity of Mt. Lyell. It was impossible to make the Lyell of Dr. Hector¹ coincide with that of Mr. Thompson, and the peak supposed to be Mt. Lyell by the latter (a most natural mistake under his circumstances) went by the name of "Query" peak throughout our trip, and remains still without an authoritative designation. This latter lies some miles to the west of Mt. Lyell and stands conspicuously as a sentinel above the triple-headed glacier, and dominates the valley as one approaches the great bend. One more objective mountain was thus added to our original programme.

Next day we started by the new trail through the woods that edge the swamps; then for a time our way continued along the strange grass-covered causeways that provide a solid road between the river and the swamps; next came long stretches of shingle flats, varied by numerous fordings of the stream, whole or in part, until a convenient camping-place was found about a mile below the junction of the waters from the triple glacier and the main stream.

The afternoon's programme was a repetition of the previous one. A long section of timber lay ahead, and both Jim and

¹ From a study of Dr. Hector's map and published notes with reference to the naming of Mt. Lyell by him in 1858, and from observations in the neighborhood, I am extremely doubtful whether the Mt. Lyell of to-day, so called by travellers who had not followed in Dr. Hector's footsteps, is the peak intended by that great pioneer explorer, but shall continue to apply the name to the mountain so designated on the only available maps. The true Mt. Lyell, I believe, lies to the east of the modern "Lyell glacier," and almost due north of Mt. Forbes.

Fred went off to cut trail. Kaufmann and I, meanwhile, climbed to the summit of a barren ridge about 9000 feet high, to get a nearer view of the big peaks, conclusive evidence as to the Lyell problem, and a bird's-eye view of the upper portion of the valley, which might help us in our attempt to reach its head in a single day. Clouds again were prevalent in certain quarters, but we got splendid visions of Mt. Forbes' pure, sharp pyramid, the triple-headed mass of Lyell, Mt. Bryce's narrow three-pointed ridge and the several intervening peaks. Mt. Columbia remained persistently enveloped till nearly sunset, when, just as we were turning homewards, the white mists rolled away and the great dome appeared in all the golden radiance of the evening glow. It was a most dramatic first appearance, and immediately laid us under its potent spell, and determined us to take the very earliest opportunity of attempting the ascent of its splendid slopes.

The good work done by our two axemen enabled us to traverse the thick forest with ease, and in two hours we emerged upon the banks of the river again, and right in front gleamed the snowy summit of Mt. Columbia, dazzlingly bright against an azure sky that fairly rivalled Italy for richness and depth of coloring.

It was a trying march thenceforward: the large boulders on the flats were terribly hard on the horses; the river, swirling along, icy-cold and very turbulent, made fording neither easy nor agreeable; the banks narrowed frequently and drove us to the woods, through which our leader piloted us skilfully, albeit a good deal of heavy axe-work was demanded from both packers, before we finally descended to a broad expanse of rough stones and shingle, where the river broke tumultuously from a deep and rugged canyon, and it was evident that there was no use in trying to take our camping outfit any further that day. So we pitched our tents just within the border of the trees, in a sheltered, sunny spot, close to a splendid waterfall, which, like a smaller one a few yards further off, sprang from a subterranean channel.

After an exciting episode, — the sudden outbreak in our camp of what at first threatened to be a disastrous forest fire, — dinner appeared a little late; and at three o'clock Chris-

tian, Jim and I moved on to make a reconnaissance of Mt. Columbia, and ascertain if it was possible or advisable to make a higher camp. Our present elevation was almost exactly 6000 feet, and the glacier snout 500 feet higher. Between the two a spell of trackless forest intervened. Going very fast, in half an hour the trees were left behind and we crossed a bare rocky slope, composed chiefly of terraced ledges, often strewn with stones, descending abruptly to the river bed. In front is the steep glacier tongue, which forms the source of the "West branch," and is an outlying portion of the great Columbia ice-field. We took to the ice at once, and climbed the rather steep dry glacier until soft snow was reached, when we roped up and continued to ascend as far as the flattened summit of the *névé*, some 8200 feet above the sea. Here we crossed the Divide, which makes a wide *détour* from the eastern spurs of Mt. Bryce, on our left, to the centre of the immense Columbia snow-field, stretching for miles in a northerly direction and then turning sharply westward to Mt. Columbia and the peaks beyond. From a better view point, a few hundred yards down the western slope, we were well pleased to see that nothing but distance and soft snow were likely to prevent a successful ascent of the big mountain. The expanse of ice-field is enormous, though only a section of it was visible from where we stood. A long *détour* was obviously necessary to reach the far-off base of the peak, and our reconnaissance was invaluable in enabling us to plan a much shorter route than we should otherwise have taken. Only a few minutes could be spared to take in the salient features of the vast scene, and then we turned and hurried back to camp at almost racing speed to make our preparations for a very early start next day.

Mindful of the fate of Professor Collie's attempt from the Athabasca glacier, the moment there was light enough to thread our way amongst the trees and forest tangle (2.20 A. M.) we set out. So lengthy a snow tramp, with the certainty of softness and consequently extremely heavy going, was sufficient, without any extra troubles, to make success at the first essay very problematical, and a hot night and troubled sky at dawn did not tend to reassure our minds. In fifty minutes we were enjoying the cooler atmosphere of the glacier after the close-

ness and toil of the rough forest ascent. For a short time we diverged to the grassy terraces on our right, but soon returned to the snow-covered ice, and made steady progress over its hard surface until we found-ourselves trapped in a chaos of huge crevasses, wide chasms and large crater-like depressions seamed with smaller fissures. So at five o'clock we roped. We had then attained an altitude of about 8000 feet and the snow remained still firm and good; but covered crevasses were numerous and some bridges we were forced to cross called for the utmost care, and were fragile enough even at this early hour to make us wish for a better way of escape from the maze in which we were entangled. Kaufmann's skill was, as always, equal to every emergency, and we soon crossed the bad bit in the hollow of the glacier and commenced to traverse the less broken surface of the nearer of the two high snowy ridges that tower above the ice-fall of the central tongue.

From its summit the outlook was fascinating in the extreme, though Columbia rose before us apparently as far away as ever. Much to our relief, we noticed that by swinging round considerably on the return journey, we could keep above the broken section lately crossed, and avoid by a slight increase of actual distance its objectionable features; for bridges, delicate at six A. M., are apt to be impassable after a day of July sun. Just beyond the ridge, at 7.20, we made a fifty minutes' halt for breakfast, — well satisfied so far, but somewhat appalled at the way in which our peak appeared to retrograde as we approached, and at the growing softness of the snow. *Per contra*, the clouds that in the early morning overcast the sky had gradually risen, and after massing rather heavily were dissipating rapidly and a clear panorama was assured. Resuming our long snow tramp, we circled round the head of the central glacier and ascended the further ridge.

The going for the next three hours was most monotonous: two or three great undulations in the mighty sea of névé had to be traversed, and we sank deeper and deeper as the hot sun increased in power. At last, however, the final billow was surmounted, the real base of the mountain proper was attained, and the steep slopes of the last 2000 feet were nigh at hand. This gradual rising of the outlying glaciers to the main level of the

enormous ice-field (about 10,000 feet), and thence still gradually to within 2000 feet of the actual summit, detracts considerably from the real height and grandeur of the mountain; and, from a scenic point of view, it is a great mistake to approach or see Columbia from its eastern side. The finest aspect must be from the depths of the low valley of the western Athabasca, whence its great altitude and imposing form are seen to best advantage, as witness Mr. Habel's splendid picture, published as the frontispiece in the last number of APPALACHIA. The summit here is 8000 feet above the river flat.

Another brief halt was made at 11.30 just below the bergschrund, and our food supplies and all the impedimenta we could do without were left there to await our return. The open portion of the schrund was easily circumvented at this season, scarcely any of the winter snow having yet disappeared, and we were soon engaged in pounding up a ladder-like arête of soft snow on a hard slippery substratum, under a scorching sun very likely to avalanche. It was breathless work. We were both terribly out of condition, it being the first climb of the season, and the long, toilsome trudge, under our packs, on a hot summer day told on our unaccustomed limbs and lungs. Some 1200 feet up, the gradient became easier and we moved with less fatigue, until a very sheer and icy escarpment confronted us at the junction of the southeast and southwest ridges. This brought the axe into play; but in a few minutes the crest was gained, and we shook hands in mutual congratulation on the summit of Mt. Columbia.

Whatever the feelings of a Governor-General or Premier may be on his appointment I am not prepared to state, but I know we felt a thrill of exultation when we occupied (though only for one short hour) the highest position yet attained in the Dominion of Canada!

As we anticipated, the previous estimates of altitude were far astray, and I believe that 12,500 feet will prove to be not very far from the true figure. Nevertheless, we appeared to stand well above all the neighboring mountains, of which the white Twin seemed to be the loftiest, and the next in altitude probably is Mt. Alberta. Thirty miles to the southeast Mt. Forbes towered high above everything in that direction, and alone chal-

lenged comparison with our elevation. But at twice that distance to the northwest Mt. Robson showed up grandly, and is perhaps the one mountain of the Canadian Rockies that exceeds 13,000 feet.

It was interesting to ascertain beyond a doubt that Mr. Habel's "Gamma," so totally unlike the Mt. Columbia of Professor Collie's photographs and my own observation from the west, was nevertheless the identical mountain, and much of the same explorer's description of the western Athabasca and its vicinity was followed step by step as we looked down upon the valleys trodden by him in 1901.

Of course the view was quite entrancing. We were sixty miles further north than any summit we had previously ascended, and most of the panorama was entirely new to the eye, though familiarity with the excellent and graphic descriptions and pictures of Messrs. Collie, Wilcox and Habel made almost all the chief features of the landscape recognizable at the first glance. Some old friends in the distant south, fully eighty miles away, Mts. Temple, Goodsir, Hungabee, Dawson and Sir Donald, and more recent acquaintances of the past fortnight, gave one great pleasure to recognize amongst the myriads of peaks of every size and shape. The crowning feature of the panorama was the survey of the immense area of the Columbia ice-field, about two hundred square miles in extent, protruding its glacial ramifications to every point of the compass, and occupying the geographical centre of the water system of a quarter of a continent.

I planted the Union Jack upon the broad, white platform that crowns the summit, and set to work with camera, plane-table, sextant and clinometer, until the hour warned us that we must depart. So, at 3.20, we reluctantly bade farewell to the grand peak and its inspiring view, and commenced to retrace our steps. The descent was more agreeable than the tedious ascent, and we plunged gaily down the steep soft slopes, until in half an hour we stopped again for some refreshment, where our provisions awaited us. Twenty minutes later we embarked on the long journey over the interminable expanse of weary snow. Soon we were both thoroughly tired out. At every step we sank in well above the ankles and usually to the knees, and as

we tramped monotonously onwards, a sort of mirage formed upon the undulating white fields of snow. Towards evening the fierce heat abated, and the conditions of air and snow improved as we swung round the wide *détour* above the lower *névé*; the glow of sunset flooded peak and glacier with golden radiance, merging here and there into the most delicate tints of rosy pink and culminating in a blaze of richest crimson glory.

Long ere we reached the limits of the snows, the sun had disappeared, but a full moon gave ample light until dark belts of cloud came up and partially or wholly obscured its soft clear light. At nine P. M. we reached the rocky terraces, and could dispense with the rope that had bound us together for sixteen hours; and our parched throats rejoiced in an ample drink of cold, pure water.

An hour's traverse of the dry glacier in the half light, and then we entered on the worst of all the day's proceedings. To travel through a forest, full of undergrowth and strewn with fallen trunks of trees, is no easy task in broadest daylight, but at night, without a moon, with limbs so tired that they will scarcely obey the orders of the will, is as tough a job as ever fell to our lot to undertake. Falling over stumps and stones, tumbling into gullies and holes, we dragged our weary way for two awful hours. And then we missed the camp, and wound up with a chilly fording of the icy torrent, before the welcome tents appeared in sight; and shortly after midnight all our toils were ended! A grand hot supper set us speedily to rights, and the joy of bed is quite beyond the powers of any pen to tell.

Sunday was a day of rest, well earned and thoroughly appreciated; and the following day we were fit for anything, and went up to Thompson pass to reconnoitre Mt. Bryce and generally survey the neighborhood.

Three quarters of an hour through the woods and we emerged upon the shores of a delightful lake; a splendid rocky pinnacle towers like a sentinel 4000 feet above its vivid blue-green waters, which are almost surrounded by a fringe of firs; and a lofty rampart, massed with trees, rises to the pass, 6800 feet above the sea, where lies a second still more attractive lake, with indented shores, clothed with brilliant greens of every shade, grasses and moss and undergrowth, relieved by the dark firs and

broken here and there by rocky outcrops. On the far side a tributary of the Bush river runs sparkling down a narrow, rapidly descending valley, sombre with heavy forests and lofty precipices, Mt. Bryce on one side and a long ridge of snow-capped mountains opposite.

We clambered up the rugged slopes and ledges on the south, to get a better view of Mt. Bryce and try to trace a feasible line of ascent. The side towards Columbia was not inviting, and as far as we could see from our present situation the great cliffs facing us offered no way of access. With our field-glasses we could detect no break sufficient to afford any inducement to make a journey far enough down the valley to find out for certain; but it is quite possible that a closer inspection may reveal at least one line whereby a scramble may effect the desired result, and, if so, that is by far the best and quickest route. Failing this, the one remaining chance was by the long ridge over the eastern (and possibly also the central) peak. But the condition of the enormous cornices and steep slopes, massed with the winter's snows, as yet unmelted and evidently awaiting the slightest pretext to avalanche, was not inviting, and it was determined after long deliberation to leave the attempt for at least a month. A drop in the barometer and several thunder showers confirmed the wisdom of this decision, so next morning we moved our camp down to the bend, where we had such comfortable quarters that we named it "Camp Content."

Clouds hung about the peaks all the following day, and climbing was useless; so Christian and I spent our time exploring the triple glacier, which is a splendid one. We also ascended the spur that separates the western glacier from the upper valley of the West branch, and from its angle, more than 3000 feet above our camp, obtained fine views of the glaciers and encircling peaks, and Mt. Columbia beyond the valley head.

On the 24th an early start was made to try Mt. Lyell, and its important topographical position caused heavy packs to be in order. A five by seven camera with eighteen plates, theodolite, field-glasses, aneroids and other paraphernalia, besides necessary extra garments and provisions, composed two weighty loads for a climb of 7000 feet. Our camp being, for pasture's sake, on the wrong side of the river, we had to ford it on horseback, and

Jim went off at half past one to hunt the ponies in the dark. By three o'clock we had crossed and were making our way through woods to the flats beyond. On reaching the glacier we kept along its right bank till we came to the eastern fall, and then faced the steep cliff upon our left, which looked extremely nasty, but promised greater rapidity than dodging crevasses and séracs, and cutting up the ice-fall.

Our distended rucksacks hampered us considerably, and in one particular chimney caused each of us in turn to stick so fast that it was only with extreme difficulty that we could extricate ourselves. At the top of the cliff a fight through dense dwarf spruces resulted in our gaining the high lateral moraine close to the head of the ice-fall. Proceeding along its crest, a flatter expanse of glacier opened out and gave us a spell of easier going, and we roped up just below the bergschrund at Mt. Lyell's base. As we threaded our way amongst the crevasses here, an icy wind struck us and gave the first unpleasant warning that the top would be a somewhat arctic locality, although a clear sky and hot sun reigned above. Breakfast was taken among the rocks a little later, and at 8.30 we assailed the steep slopes of rock and snow, where the axe had to be freely used, till we came to a hollow lying sheltered between the central peak and the spurs from the eastern and western summits.

Here we were roasted by the scorching heat of sun and snow glare as we plunged through knee-deep snow, winding hither and thither to avoid the numerous crevasses. Ascending directly between the central and western peaks, the surface grew harder, and in an icy gale, that whirled the sharp, frozen particles of snow in a thick cloud across our path, we gained the col, a lofty one nearly 11,500 feet up, and looked down upon a long and easy slope of névé, stretching away before us in unbroken purity almost to the head of Glacier lake, with the grand, regal pyramid of Mt. Forbes piercing the heavens above; then, in a chilling hurricane, amidst the driving turmoil of the snow, we hastened up the ridge towards the central summit,—the highest of the three, though the western is only a few feet lower.

Mt. Lyell proved, as I had long anticipated, the key peak of this huge mountain group, seventy miles by twenty-five, com-

prised within the limits of the upper waters of the Athabasca, Bush, Blaeberry and Saskatchewan rivers. Situated almost at the centre of this section, and little short of 12,000 feet in altitude, it forms a natural observatory, from which a marvellous outlook is obtained. The eye sweeps round to the far horizon in a circle one hundred and fifty to two hundred miles in diameter, and is caught here and there, as it wanders over the bewildering sea of mountains, glaciers and valleys, by the more prominent summits of the distant Selkirks or the far-reaching Rockies. But, first in importance, almost exactly at the opposite poles of vision, the two greatest and grandest of them all command our admiration and attention: Mt. Forbes, a snow-white cone, alone in its supremacy, and Mt. Columbia, likewise pure and preëminent, but surrounded by an entourage of peaks of marked distinction, — the Twins, Alberta, Athabasca, Bryce and others, that rise above or almost to the height of 12,000 feet. Although Mt. Robson, far away to the northwest, may surpass in altitude any of these peaks, yet the general system there is far less lofty and indubitably of far less geographical consequence than this region, up to now as a distinct range without a name.

An interesting feature was the discovery of the extent of one of the western tributaries of the North fork, hitherto mapped as short and of very minor rank. It now appeared as a deep enshadowed trough, jewelled with a host of little lakes, and fed by a considerable glacier which descends apparently from Lyell's eastern peak, between two splendid walls of rock that sever it from the great Lyell glacier on the south, and the West Branch valley on the other side.

In spite of the keen and violent wind and a temperature twenty degrees below the freezing point, it was necessary to try to vindicate the bringing of the big camera and transit to the top. The snow was soft, and the tripod had to be sunk almost to the head to get any pretence of steadiness. Even then so great was the vibration that only a rapid exposure could be made, and when it came to the turn of the theodolite, the acme of tribulation was experienced. Prone on the snow, with fingers numbed, I endeavored time after time to fix the quivering telescope upon the apex of the desired mountain and turn the



FROM THE SUMMIT OF MT. LYELL, LOOKING NORTH.



FROM THE SUMMIT OF MT. LYELL, LOOKING SOUTH.

From photographs by James Outram.

ice-cold screws to a true adjustment; but with all one's trying the wind and cold had certainly the upper hand, and I should be very loath to stake my reputation on the results obtained. For three awful hours these trials of an amateur attempt at semi-scientific work were thus prolonged, considerably aggravated by the knowledge that Christian had dug himself a cosy shelter in the snow at the southern edge, and was comfortably reposing in his sunny niche, where not a breath of wind disturbed his peace.

At last my trying task was over, and at 2.15 we started at high speed down the hard slopes. Arriving in sight of camp at 7.50, our shouts were answered speedily by Jim, who brought our horses over for us, and in a very few minutes we were once more in "Camp Content," enjoying a good supper round the blazing fire and more content than ever.

The next three weeks were spent in carrying out my plan for joining forces with Professor Collie and his companions. In the eleven days that we were together Mt. Freshfield and Mt. Forbes were successfully ascended and other interesting expeditions made, the chronicling of which I leave to another member of the party.

By August 16, we were back in "Camp Content," and, after two wet days, commenced the last week of mountain work. I had three objects in view for my next expedition, — a most ambitious programme. First, to ascend "Query" peak; then to investigate the pass at the head of the western glacier; and, finally, to make a way thence to Thompson pass. To this end, I burned my boats and sent the outfit to the Columbia camp, whilst Kaufmann and I set out at six A. M. on the 19th, in the hope of achieving at least two of these projects and gaining the shelter of the camp ere nightfall.

We took our way up the centre of the glacier, swinging round to the western affluent, which was covered with débris, amongst which we picked up numbers of iron cubes, some of considerable size. A noteworthy incident was the discovery of a large cascade almost in the middle of the glacier. A turbulent stream flowed far across its undulating surface in a deep-worn channel, till it pitched headlong into a huge circular chasm and disappeared beneath the solid ice, fully sixty feet in thick-

ness, continuing its hidden course till it emerged into the light once more three miles further down.

Our desire was to attempt the peak by the northwest arête. Previous observation showed that probably three sides were inaccessible, but we hoped a closer inspection might reveal a way to escape the difficulties of the sheer or overhanging cliffs of the sky-line, and save the long *détour* required to reach the easy but most distant side. So we intended to try the long arête that stretches westwards from the secondary peak, an almost exact duplicate of the larger one. This could probably, in ordinary years, be gained directly from the glacier by scaling the cliffs beyond the precipices in the angle of the west and central glaciers; but above these extended a cornice two or three miles long, so large and seemingly unbroken, that we did not deem it worth while to risk the chance of failing to get through it, and therefore determined to continue by the much longer glacier route.

The ice-fall forced us to the rocks on the left side, and they were so awkward that the rope was put on as a precaution. Eighty minutes' scramble took us high enough to try the ice again, and by skilful turning and twisting among the numerous crevasses, crossing many startling bridges, a safer but softer part was reached, and a steep and nasty finish brought us to the glacial pass at eleven o'clock, about 10,000 feet above the sea.

A lofty ridge separated us from Thompson pass and the valley running from it to the west; in front, a glacier descended into a tributary valley, with a conspicuous unnamed mountain in the background. On our left rose the arête parallel to the glacier of our approach, and after lunch we commenced work in that direction. Steep at first, it soon became comparatively easy in gradient, and we kept mainly to the sky-line; some short and interesting bits of rock-work gave variety, and the universal looseness of the structure and occasional perpendicular drops of many hundred feet demanded caution, but we ascended rapidly, traversed several low eminences on the ridge, and in an hour and a half reached the culminating point west of "Query" peak and its miniature. This was over 11,000 feet in altitude, and commanded a fine prospect.

But the chief interest to us lay in the peaks ahead. The wet

weather of the past few days had left fresh snow upon the rocks, and many a glassy film and slope of ice made things look awkward. But the secondary peak, which would have to be traversed, appeared practicable. Most formidable, however, was the main ridge of the larger mountain. The actual arête was perfectly impossible, being broken in at least two places by canopied masses of overhanging rock some scores of feet in height. The north side is absolutely sheer, and we could see no way up the face before us which, under existing conditions, looked available. However, we went on, to try to get a clearer view before declaring it wholly inaccessible. But so distant was it still that by 2.30 we were only at the lower peak, and it was obvious that with the extreme difficulties presented by the fresh snow and verglas there was no time to think of an ascent, and even to climb the nearer point would involve us probably in serious troubles, for a long and untried tract lay between us and camp, and the days were getting short.

So we retraced our steps, set up the usual Union Jack — my visiting card — upon the summit of the ridge peak, which we nicknamed "Consolation peak," had some lunch, and hurried to the glacier pass, where we arrived at 5.15. Our way now lay along the hard snow slopes below the ridge on the Thompson Pass side. We knew that there was nothing like a pass in this direction, for we had already scanned the long and lofty wall that rises with almost unbroken perpendicularity for miles above the valley; but we had hopes that we could work along the crest, and, traversing a rocky peak crowned by two shattered towers, eventually descend by slopes of scree to Thompson pass.

This we succeeded in doing after some eerie experiences. The first was the breaking away of a huge mass of rock, down which I was clambering. Kaufmann had preceded me, and felt no insecurity, but when my full weight was hanging from its upper edge, a tremor, followed by a distinct yielding, warned me of danger. Instantly swinging to the inner side, I dropped the few feet remaining to a fortunately fairly ample standing-place, and Christian's firm and ready grip steadied me as half a ton or so of rock went crashing to the base of the precipice, 1500 feet below.

The edge of the ridge, to which our progress was confined, became intensely steep, often vertical, and in places overhanging, and it took slow and cautious climbing to effect a descent. The dusk was deepening as we reached the foot, and we scrambled up the six hundred feet of arête to the towered pinnacle beyond by the assistance of the fitful moonlight. The long shadows and uncertain light made it very difficult to judge distances or steepness, and on the ice-field on the further side especial care was needed. The peak itself, 10,300 feet, was crossed at eight o'clock, and in three quarters of an hour we were unroped and scurrying wildly down the loose scree, glissading wherever a patch of snow appeared. At ten o'clock we threw ourselves at last upon a grassy couch beneath the sweeping spruces that border the lakelet on the summit of the pass.

It was so late and dark that Christian did not at all relish the idea of another midnight tussle with the dense jungle that separated us from our camp, and proposed to stay where we were. I was of opinion that even a repetition of our Columbia finish was preferable to a night in the high open, — with little shelter, no blankets, and no food. But as Christian utterly refused to let me leave him and go down alone, as I desired, I agreed to remain. In less than an hour my teeth were chattering, and I announced that I was not prepared to endure five hours more of such conditions, but begged him to stay, as the way was quite impossible to miss. This he declined to do; so on we went, and found things infinitely better than we expected, less than two hours sufficing for the journey; and again we roused our admirable chef from his post-midnight slumbers at this Columbia camp, and in a few minutes were seated by a roaring fire, partaking of the delicious soup, hot tea, and bannocks, prepared *à l'instant* by his willing hands. I, for one, as I crept into a comfortable sleeping-bag, after this excellent meal, did not regret the extra journey, and rejoiced that I insisted on leaving the cold and hungry summit of the cheerless pass.

Next afternoon we returned to spend the night up there, equipped with blankets, two days' provisions and other necessities for a bivouac, previous to an attempt to climb Mt. Bryce. We found a snug location, under a clump of balsams, with

a sparkling stream close by. Heather and fir-boughs formed sumptuous beds; fuel was gathered and provisions laid out, when the appalling discovery was made that we were without matches. Christian had none, for about the first time in his life. I had started with a pocketful, but the forceful struggle through the forest tangle and stiff branches or other fatal cause had emptied that pocket completely, and not a single match rewarded our united search. Kicking the pile of wood away, I subsided in chill despair, whilst Kaufmann deposited a "billy" full of ice-cold water before me and announced solemnly, "Supper is ready!" We tried cold-water bovril, but cannot recommend it warmly, and the chilly evening air, combined with a plague of mosquitoes and yellow stinging flies, drove us betimes to our sleeping-bags. We overslept, of course, and, having no fire, decided to wait for breakfast till we got into sunlight, and thus set off at half past four.

There was little prospect of a successful day. The clouds hung low on all the larger mountains within sight, but we steadily pressed on, hoping for better things. Crossing the Divide, we skirted the loose scree slopes upon the northern side, ascending till the glacier was reached, and then made our way towards the rocky face of a subsidiary point just to the east of the main mass of Mt. Bryce. On one of the lower ledges we halted for breakfast, and then by snow and slippery slabs, clambered up to the connecting ridge above. A small cornice had to be broken through and a straight-up wall of soft snow climbed, just over a good-sized crevasse. Footholds were with difficulty secured, but by patience Christian succeeded in time in drawing himself to the level snow above.

Before us now lay a stretch of *névé*, sweeping down to join the Columbia glacier near its southwestern limit, and terminated on the upper side by a precipice surmounted by a cornice. Beyond this the *arête* of Mt. Bryce rose rather steeply, flanked on the southern side by this same precipice, which continued almost to the summit of the eastern peak. The northern slopes were less steep and much more broken at first, though higher up conditions became less easy and the edge of the ridge proved to be the only practicable route.

After cutting up the icy slopes to the rock base, a series of

ledges, large or small, short bits of cliff or broken ridge, provided for the most part easy work, the customary rotten rock being the only drawback. Later on, the traversing of icy or snow-filled gullies gave variety, and then we came across perhaps the nastiest piece of rock-work attempted so far in the Rockies. Fortunately it was but seventy feet in height, but nearly sheer, absolutely rotten and almost destitute of holds. Partly in a sort of rift and partly hugging the buttress of the arête, we gradually worried our way up, though Christian almost counselled giving it up, in view of the still greater difficulties which would be involved in the descent. But the dislike of turning back, especially on two successive mountains, prevailed, and in due time we struggled to the top.

Then the character of the climb changed. The arête lay at a far smaller gradient than heretofore, and rock gave way to snow. At first we revelled in the easy going, but soon the northern slopes began to tilt alarmingly; enormous cornices compelled us to traverse their steep surface on snow so hard that steps had to be cut all the way, and strange transverse crevasses caused some trouble and anxiety.

At length, at 11.50, we reached the loose pile of broken rocks that forms the easternmost of the three summits, and sat down to rest and eat our lunch. The view was very fine in all directions, for the early clouds had risen and hung in heavy masses above the sea of peaks, just clearing the topmost pinnacles.

Thus far we had enjoyed a first-rate climb, the only objection being the time occupied, and already we were speculating on the probability of a night out on the mountain. Fortunately the middle peak could be avoided by descending six or seven hundred feet to the wide glacier below, skirting the base and reascending to the dip between it and the highest summit; and the idea of defeat except by an absolutely impassable obstacle was not for one moment to be entertained. In thirty-five minutes we were hastening down to the soft surface of the névé, wary of crevasses, but wasting no time, and an hour and a quarter sufficed to bring us to the gap at the foot of the last ridge.

Once more our spirits fell somewhat as we examined its condition. A knife-edge of hard snow to begin with was all right;



MT. BRYCE, FROM THE SOUTHEAST.

From a photograph by James Outram.

likewise a short bit with a cornice towards the south; but beyond, came a long sharp arête, crowned by a tremendous cornice in the opposite direction, overhanging the dark valley depths many thousand feet below. To avoid this danger, it was necessary to keep well down on the southern slope, exposed to the full influence of the sun, which had made the deep covering of snow (tilted to begin with at as steep an angle as it could lie) soft and treacherous over a substratum of a glassy character, and ready to avalanche at the slightest pretext.

When we first set foot on this, again the question of retreat was mooted, and again the thought of two consecutive defeats spurred us on to try a little piece ere the final verdict was pronounced. My confidence in Kaufmann's skill was implicit, and he believed the passage could be made in safety. So on we went, with intense care. Advancing with cat-like tread, each step was trampled cautiously and solidly before the next was made. A frequent slide of crust, with ominous hiss, would start a miniature avalanche, that rushed and thundered down to the distant glacier. Two on a rope for this kind of work was hardly the best arrangement, but skill and care came out victorious, and, after a nasty scramble up a soft wall of most unstable snow, a solid stretch of easy ice and snow alone intervened between us and our goal. Below the summit hung a strange chaos of glacier, broken up by grand crevasses, ice-towers and séracs, through which we wound our way, and breaking through a little cornice stood at last upon the snowy apex of Mt. Bryce.

The altitude was about 11,800 feet, the time 3.40, exactly eleven hours since the start, and only 4700 feet of actual ascent, which reveals the character of the climb better than much description. On three sides were almost perpendicular drops, those to the north and west descending more than 8000 feet into the heart of the Bush River valley.

Photography and survey work had to be done all too hurriedly, as the lateness of the hour and well-attested difficulties combined in an imperative demand for an immediate return. In less than half an hour our faces were turned homewards. The colder evening air and the passing of the sun's glare from the south face were already having their effect upon the bad

snow slope ; and, although the utmost caution was still required, we could move more quickly than we expected, and by 5.20 were at the gap again. Hurrying over the glacier at a great pace, we climbed the eastern peak so rapidly that I was destitute of breath and pretty well used up by the time we arrived at that sharp little summit.

The fast gathering gloom and chilly wind permitted but five minutes' stay, to regain breath and munch a bit of chocolate, and at 6.25 we were on the move once more. The morning's steps aided considerably our advance, but it was very dark when we came to the edge of our well-remembered cliff. Considered almost impossible by daylight, what was to be thought of the descent by night ? As I should be the first to go, with a good rope in Kaufmann's trusty hands in case I failed to find a hold or one gave way beneath my weight, the danger was the guide's alone, and to him I left the onus of deciding. After some thought, his verdict was to make the attempt, see how I found it, and if things turned out well to follow : for the entire absence of shelter on our narrow ridge, the piercing wind, our saturated boots certain to freeze ere daylight, and the scarcity of food, urged us powerfully onward.

It will be long before I lose the recollection of those seventy feet of cliff ! Drawn out for one slow hour of concentrated tension were the successive experiences of blind feeling for the scanty holds with chilly fingers, helpless waving of feet in the darkness for something to rest upon, agonizing doubts as to their stability when found, eerie thrills when crumbling supports gave under the stress and hurtled downward into the blackness of space, the strain of waiting on the best, but very questionable, protuberances whilst the exigencies of the rope compelled Kaufmann to come down twelve or fifteen feet and let me move again, the relief of feeling solid and sufficient standing-room once more, the patient intensity of watching and hauling in the rope as it came slowly down, telling of Christian's gradual descent, the anxiety lest any accident should occur to him, and at last the thankfulness as his figure loomed close above and very soon stood safely at my side, — a gallery of vivid memories.

In the dim light we poked on slowly down gullies, walls, and ledges, tracts of loose débris, patches of snow and ice, to the

broad névé where the mountain proper ends. It was now past ten, and we allowed ourselves a few minutes' rest before commencing the final portion of the journey. To avoid several awkward places, a variation from the line of our approach was made by taking a long détour, probably to our advantage, but involving more trouble than we anticipated in the negotiation of a steep corniced ridge, which in the dark had to be descended backwards with a good deal of labor in making steps in the hard snow. Then came a swinging tramp down the snow-covered glacier, — our wearied limbs and the uneven surface, under the feeble light of a clouded moon, making us swerve and stagger in a most suggestive way.

Once off the glacier, the rope was unfastened, a delicious draught of iced water obtained, and we pressed on through heather and dwarf trees, across long tracts of stones and boulders and interminable slopes of sliding screes, until the pass was gained, and at one A. M. our cheerless bivouac appeared. Though nothing but a little chocolate had been our sustenance since noon, it was too dark and we too tired to enjoy cold bovril and canned mutton at this dismal hour. The blankets appealed most strongly to us ; and we slept the sleep of the just till dawn, and then descended through the woods to camp, where warmth, fire and breakfast set us to rights speedily. And a few hours later all were once more en route for Camp Content, and a last farewell was said to this strangely fated camping-ground, where all three expeditions had involved us in post-midnight returns from more than twenty-hour climbs.

The following day our homeward journey was commenced, the same route being adopted as when outward bound. On August 26, Mt. Wilson was traversed from end to end ; the next day we swam the Saskatchewan, and on the 30th we arrived at Laggan.

Observations on the Physiology and Hygiene of Climbing.

BY RALPH C. LARRABEE.

Read March 11, 1903.

MOUNTAIN climbing is commonly classed as one of the most severe forms of exercise. It is not necessarily so, perhaps; for any healthy person *may* climb easy, mountains in a slow, leisurely manner and do it with profit. But most of us, in climbing a mountain, put forth a degree of physical exertion which is vastly in excess of what suffices for our ordinary daily occupations.

Now this demand for extra work falls primarily on the muscles. Secondarily, many other organs are called upon. The most significant of these is the heart, which has to pump more blood to the muscles and other organs doing increased work, in order that they can have the additional nourishment and oxygen which they require, and that they may get rid of their excess of waste products and carbonic acid. The effects of exercise on the heart, moreover, are the cause of the most obvious phenomena; and this organ is the one most apt to be seriously injured. Familiar evidences that the heart is doing more work during exercise are the rapid pulse, throbbing heart, and labored breathing. It is often noticed that these symptoms are most marked at the beginning of exercise. After fifteen or twenty minutes, though the exertion continue with undiminished severity, a runner or mountain climber gets his "second wind" and proceeds with more comfort than before.

Careful examination of an athlete before and after several hours of continuous violent exertion shows certain other changes, the most important of which have to do with the circulatory organs. In the first place, the heart will be found to have increased in size. This is explained as a dilatation of its cavities from overstretching or relaxation as a result of fatigue, not as an increase in the thickness of its walls or of its weight. The heart sounds are often modified in a way which suggests a leaky valve. Changes of much interest are noted in the blood pressure, — that is, the force exercised by the blood against the

walls of the arteries. This rises rapidly at first and then falls to a point below normal, even though exercise continues with undiminished severity. The primary rise may be considerable; I have twice seen a rise of sixty per cent. in myself while climbing. The rise in the few cases which I have studied has reached its maximum within a half hour, and has subsided in about an hour. The results obtained by Oliver in the milder exercise of walking on a level were much the same. These phenomena are not as yet fully understood. They are probably due in part to changes in the distribution of the blood in the arteries and veins.

These changes are not to be regarded as evidences of injury. They are merely normal phenomena of violent exertion. Some of them — for instance, the enlargement of the heart — will be present only to a slight degree, or will even be absent altogether unless the exercise be very severe. In the vast majority of instances they will promptly subside after the exercise is over. They show, however, that during exercise the circulatory organs are working on an entirely different basis as compared to the conditions when at rest. At the beginning of a hard climb they have to adjust and adapt themselves to the new conditions, though many of the details of the process are unknown to us. "Second wind" probably has to do with these adjustments. One is tempted to believe that it concerns particularly the changes in blood-pressure, but, so far as the writer knows, this has not been proven, and other explanations have been offered.

A person's climbing power depends partly on the strength of his muscles, but even more on the efficiency of his circulatory apparatus, for the "wind" is largely a matter of the heart. In both these respects it may be improved by training. Though we do not know all that takes place during training, we know that the heart grows larger and stronger, just as the muscles do, and that there is a loss of superfluous fat. There appears to be also an education of the parts involved or of the nervous centres controlling them, perhaps in the way of accustoming them to the work in hand, so that the adjustments mentioned above are more readily and quickly accomplished. This may account in part for the fact that one's second bicycle ride of the season is already much less fatiguing than the first, or that a

day or two of climbing is enough to put one in fairly good trim, — results too rapid to be explained wholly on the basis of structural changes.

It is advisable, then, for a person of sedentary habits who is planning a series of climbs to do a little preliminary training. It is of course impracticable to most of us to train systematically, but any one can for a couple of weeks reduce his tea, coffee and tobacco to a minimum, eat carefully, keep good hours, and take a little hard exercise daily. This last may consist of a walk of a mile or two, best to include a good stiff hill, at a rate sufficient to cause decided shortness of breath. Running, or even a little "scorching" on a wheel, may perhaps take its place. Many are troubled with stiffness of the muscles of the front of the thigh or abdomen after the first day of climbing. This may be anticipated and prevented by exercises bringing these muscles into play. If a really serious and difficult ascent is planned — one whose success is going to be a matter of physical strength and endurance — careful and systematic training is as much demanded as in preparing for any other athletic feat.

As regards the possibility of injuring the heart, it may be said that, with rare exceptions, a well-trained, healthy young man cannot do himself any harm. With older persons, however, the case is somewhat different. It is an aphorism amongst physicians that "a man is as old as his arteries." In other words, with advancing years changes take place in the heart and blood-vessels which greatly increase their susceptibility to injury when they are called upon to bear unusual strain. We all know strong climbers of sixty or even seventy, but such men have always been athletic in their habits. As long as their general health remains good many of them may continue to climb with profit. Such men as a rule are quite aware when their powers begin to fail. But a man of fifty or more who takes up climbing for the first time would do well to begin by consulting his physician, to train carefully and then to join the "slow squad." He cannot hope to break records or to win new and difficult peaks.

Children, though they may be taken into the woods and allowed to romp and play to their hearts' content, should not do hard climbing. This is especially true during the period of

rapid growth between the ages of ten and fifteen. Military surgeons, indeed, find that soldiers under twenty years often prove unfit for active service, and, particularly if tall and lanky, are apt to suffer from heart-strain. Very fat people, convalescents, and those suffering from any organic disease, especially if it concerns the heart, blood-vessels or kidneys, should climb only under the advice of a physician.

Tobacco, by disturbing the nervous control of the heart, leads to shortness of breath and predisposes to heart-strain. It is very properly forbidden to athletes in training. Climbers should at least reserve it until the hard work of the day is over.

Liquor should also be avoided by climbers. It is surprising to note how much brandy and whiskey goes up a mountain, even with a party of teetotallers—not, of course, as a beverage, but as an emergency medicine. As such I am inclined to believe that it is often used unwisely. In the first place it should never be used to guard against exposure to cold. The sensation of warmth it produces is due to the dilatation of the superficial blood-vessels and the consequent warming up of the skin. It will readily be seen that this favors the radiation of heat and makes the body as a whole, including the vital internal organs, colder. In examining the participants in the Boston Athletic Association's annual twenty-five-mile "Marathon" run, we found that without exception the lowest temperatures were in men who had used liquor. Experience has taught Arctic explorers, and others who have to work in the cold, the harmfulness of alcohol under such circumstances. After reaching shelter and the warmth of a fire this objection no longer holds. Neither should brandy be used in treating the common disorders of the stomach and bowels, nor, in spite of theoretical considerations, as a food.

The only important use of alcohol to the climber is as a stimulant in cases of accident or sudden emergency, and even here it is rarely needed. There is at present much doubt among physicians as to the propriety of classing alcohol as a stimulant at all, as there is no sound experimental basis for so considering it. Military and naval surgeons, and others having under their care large bodies of men, agree that alcohol

decreases the capacity for sustained exertion, and carefully conducted experiments show the same thing. Therefore, while it might be of temporary value in a sudden emergency, it would probably not sustain a man throughout a long climb that would otherwise be beyond his powers.

When a climber becomes exhausted there are three things to do. First, stop the whole party and let him rest, or if possible let him take a nap. Second, give him something to eat, — something simple and easily digested. Third, divert his mind and cheer him up, for fear will greatly increase the effects of exhaustion. If a little whiskey will enable an exhausted and disheartened man to rise superior to his environment there is no objection to it, for whiskey is without doubt an excellent "jollifying agent." The psychical element in accomplishing difficult climbs can hardly be overestimated. It is astonishing, as one of our most experienced climbers has said, what can be done under the stimulus of success as contrasted with the incapacitating depression of defeat, — a phenomenon which has appealed to him as being akin to hypnotism.

One often hears it stated that water should not be taken during a climb. Soldiers are often advised to take a good drink before starting the day's march, and then not to drink till the noon rest. With the more violent work of the climber I am inclined to believe that the case is different. The body needs for the proper absorption of its food, for the carrying on of its chemical changes, and for the elimination of its waste-products some two to three quarts of water daily — about half of which is ordinarily taken in combination with solid food. During exercise, especially if sweating is profuse, more is needed, and since the food carried is, for reasons of economy of weight, as dry as possible, an unusually large proportion must be taken as drink. On the other hand, a large drink throws an increased amount of work on the heart, particularly if taken at the beginning of exercise while the organs are getting themselves adjusted. It would therefore seem best not to drink during the first half hour, or until the so-called "second wind" is established, and then to satisfy the thirst by frequent small drinks, rather than a single copious one.

As to food: Careful studies of the diets of athletes in train-

ing and others doing hard muscular work show that decidedly larger quantities are needed than by persons engaged in less arduous pursuits. The amount of nitrogenous matter is usually found to be particularly large. For practical purposes there is no better guide to the quantity and quality of food needed than the appetite. Care should be taken, however, not to overload the stomach, and to avoid articles which experience has taught to be indigestible for the individual. Disturbances of the stomach and bowels, even though trivial in themselves, will greatly decrease the ability to do hard work.

The question of food becomes particularly pressing on actual climbing days. In spite of the importance of food in the prevention and treatment of exhaustion, fatigue decidedly decreases the digestive powers. This is not only a matter of common observation, but it has been demonstrated by experiments on animals and on man that continued exercise impairs the quantity and quality of the digestive juices and increases the time needed for gastric digestion. These facts are probably due to changes in the distribution of the blood. The experiments of Salvioni indicate a rapid return to the normal condition after exercise has ceased. The inference from these facts is that we should choose, on days when long, hard climbs are to be attempted, simple food of a sort which will be quickly and easily digested, and that, so far as possible, we should rest before and after eating.

It is a well-known physiological fact that muscles use up much more of the sugar brought to them by the blood during activity than during rest. This suggests that the muscle derives its energy from the combustion of the sugar. If the greater part of the sugar be removed from the body of an animal by the administration of certain drugs it is found that its muscles behave like normal muscles in the late stages of fatigue (Lee, quoted by Herter), and that the administration of sugar will restore them to the normal. Other experiments have shown that the use of large quantities of sugar will lessen the effects of fatigue of muscles and retard their onset. These considerations have led to the trial of the addition of much sugar to the diet of athletes in training and of soldiers making forced marches. The results are said to be very good.

This does not mean, of course, the exclusive use of sugar, but merely that it may be added to the ordinary mixed diet. It should also be remembered that the sugar of the blood is derived from the starches as well as the sugars of the food. Some would doubtless find that sugar as such would upset the stomach, but if taken in small quantities in the form of rock candy it would be palatable and would necessarily be slowly ingested. It would be especially available for use while actually walking. Sweet chocolate has been much used by climbers for this purpose. While it contains about half its weight of sugar, besides some fat, many find it very hard to digest, and the writer has seen several cases of very severe indigestion as a result of its injudicious use by climbers. Raisins, prunes and other dried fruits are palatable and refreshing. They contain much sugar and are also somewhat laxative, — an advantage to many.

To summarize: Climbers may increase their efficiency by training. They are not liable to injure themselves by over-exertion unless they are too young or too old or suffering from disease. They should be temperate in their habits and judicious in the selection of food. The carbohydrates are the foods of most service on long, fatiguing climbs.

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The New Swift River Trail and its Bearing on the Club's Policy.

BY JAMES STURGIS PRAY.

Read February 19, 1903.

THE opening of this path has been the principal new work done by the Club this year. The trail extends from the Albany-Waterville line on the south bank of the Swift river to Camp No. 6, the present northern terminus of the American Institute of Instruction path from Waterville, an estimated distance of about four miles, entirely within the township of Waterville and upon the holdings of the Livermore Mills, to whose constant good-will the Club has owed so much in the past. The eastern end of this new path, one and one half miles from Shackford's, has been made accessible from the Swift River intervalle by local improvement of the old trail which crosses Sabbaday brook a few hundred feet above its junction with the Swift river.

Part of this old trail was once a wheel road, and, in one form or another, it is said to have been kept open continuously for at least forty years, which fact is regarded as giving the public an indisputable right of way. The new trail continues along the south or right bank of the Swift river, which it follows for about one and one quarter miles to Pine Bend, sometimes skirting the very edge of its high bank, commanding beautiful vistas up and down the stream, at other times out of sight (rarely out of sound) of the rushing water. From Pine Bend it makes an interesting short cut of about one and one quarter miles to an old logging road from Camp No. 6, and finally follows this road about one and one half miles to that camp. The path is generally level, following the river bottom, but its otherwise flat grade is relieved by certain ups and downs where it crosses the valleys of tributary streams. Everywhere it is through beautiful forest, from once entering, just above Shackford's, till finally coming out upon the old logging road, and even this region is beautiful again, it having been logged so long ago.

Taking advantage of existing fragments of trail made by fishermen along the river at the east end, and of the logging road at the west end, the trail has cost but about twenty dollars

to cut out and render, with one exception, a thoroughly comfortable and unmistakable trail. It is well furnished with sign-boards, but in one part of its course, for greater directness, it has been carried through rather wet land, and here in some places some short spruce pole-bridges should be added another year. The path was laid out by the Councillor of Improvements, and the work done by Onslow S. Smith, of Passaconaway (Albany), whose familiarity with this part of the White mountains, as well as his personal qualities, render him one of the best possible guides. The old Swift River trail, as far as the Waterville line, was this year cleared by him at his own expense.

This whole Swift River trail, more than for its inherent value, is important as a trunk line connecting the Bartlett, Chocorua, Tamworth, and Wonalancet paths with routes to Waterville and Livermore; and it is proposed to extend it eventually into the Pemigewasset valley, where, supplemented by the Henrys' logging railroad and the East branch, it will connect with the Club's path over Bond, Guyot and the Twins, the route out through the Zealand notch, the route by Willey brook and Willey pond into the Crawford notch, and by Carrigain brook back through either the Hancock notch or the Carrigain notch to Livermore. This proposed extension of the Swift River trail from the present terminus at Camp No. 6, across the divide between Mts. Kancamagus and Huntington and down to the bed of the old logging railroad, can be made at comparatively small cost, as a rough trail used by loggers passing from the Livermore to the Lincoln Mills already exists, and needs scarcely more than to be bushed out and made unmistakable by occasional path-signs.¹ Its importance as a connection and its densely grown-up condition in certain parts seem to warrant its improvement and adoption by the Club. Moreover, the views from this notch, which is the highest in the region, are to the eastward often fine, and to the westward over the lumbered region, though often far from beautiful, are full of interest and instruction.

¹ This route was traversed this season, and signs were put up at certain critical points, which would temporarily make the way more sure without in any way committing the Club to responsibility.

This naturally leads to the consideration of the future policy of the Club in its relation to paths for which it may be held responsible. Two of its previous Councillors, Mr. Parker B. Field and Mr. Louis F. Cutter, have advocated limiting future extensions of the Club's scheduled paths to the development of important through lines, connecting one centre of interest with another. The Swift River trail and its proposed extension sufficiently indicate the present Councillor's emphatic accord with their view, which might have some claim to be regarded as the established policy of the department. He believes that eventually all the main paths, such as those just referred to, and including those along the crests of the ranges, like the Presidential range, as well as over the Carters and the Moats, should be maintained by the Club and the Club be responsible for them. Such paths should always lead from one settlement or quasi-highway to another, and if properly chosen these lines will effectively cover the whole White Mountain region. They will include on the one hand such paths as the Crawford path, which are too important to be left to individuals, less broadly interested in the whole region, who may perhaps neglect them, and others, such as the Swift River trail with its proposed extension, which are too long to ever be maintained locally in assured uniformly good condition.

In this comprehensive scheme it is assumed that local sets of paths, sometimes leading to features of particular local interest, and always to one side from the most convenient through routes, shall be maintained as now, but to an ever increasing extent, by such local organizations as the Waterville Athletic Association and the Wonalancet Outdoor Club, and by individuals locally interested, including hotel proprietors and summer visitors.

The value of these local organizations is not generally appreciated, and even from the Club's point of view is not by any means to be measured merely by the saving of effort and outlay on the latter's part. The moral effect locally of such an outdoor club as the one proposed is of the highest importance, and the influence of such a club for improvement is very far-reaching. Such an organization, for instance, should exist at Jackson, and it is believed that a little intelligent effort on the part of those members who go there summers would result in the formation of

a club similar to those at Waterville and Wonalancet. The hotel proprietors, besides assisting directly in the support of purely local paths, would, it is believed, give financial aid more freely to the construction and maintenance of community-to-community paths which, with the existence of local enthusiasm, become of correspondingly more value. For trampers would go out of their way to take in Jackson, as they now do to visit Waterville because of its famously beautiful paths, well kept up by its local society. Jackson is a most important centre of interest, and there certainly is excellent material there for recruiting such a club.

The Club should, as rapidly as satisfactory arrangements can be made for such maintenance, give over to the care of others paths now scheduled, which are of this local sort. By its control of the through lines and its assumption of responsibility for their condition, it will best fulfil one important purpose of its organization, namely, the opening up to the public by well-chosen routes the scenery of the White mountains. Furthermore, by taking the initiative whenever the occasion seems to call for it, in the opening up of other paths of more local value, to be subsequently maintained locally, it will still further fulfil this purpose, since, as the central organization with the most comprehensive interest, it should be best fitted often to locate such new paths.¹ Whenever possible in such cases the Club should secure local assistance in the work of first construction, its purpose being primarily at such times that of an adviser or director. It is believed that local organizations will welcome

¹ An interesting instance of a purely local but intrinsically important path is that which leads from the line of the Boston & Maine Railroad, about two miles north of Bemis Station, to Arethusa falls on Bemis brook, which are among the finest falls in the whole White Mountain region. Sweetser's Guide, published in 1896, states that they are 176 feet high, are surrounded by rich and luxuriant forest scenery, and can only be reached by the arduous route up the brook-bed, and finally, although only one mile from the railroad, that it will seem five miles to any one following this route. It is not now generally known that the path above referred to exists. It is maintained by individual initiative, and assurance is given that it will be placed in good repair this coming season. It is cited here as a typical case of a path which should from its local character and interest not be adopted as a part of our system, and which yet should not be allowed to lapse should the present maintainer for any reason cease to provide for its maintenance. In that event, the Club should, if necessary, step in and keep it open till other similar maintenance can be arranged for.

such a centralization of power and division of responsibility, since every local path, directly or indirectly connected with the Club's lines, will gain greatly in value by this connection, both in the increased number of visitors which will be led to visit that particular locality, and by making readily and pleasantly accessible from that locality all the rest of the White Mountains.

While the change above suggested in the Club's schedule of paths can, and of course should, be brought about gradually, and while, too, the cost of maintenance under the new arrangement when complete will be much less per mile of path, it is probable that for a few years the expenditure of the Department will need to be somewhat increased in order that the work may proceed to good advantage. Assistance should be sought wherever likely to be gained, and besides those sources of aid formerly more or less fruitful, as a new and possibly very valuable one there have been suggested the school camps in the White Mountains, in some of which it is the aim to train the boys in woodcraft, to give them wholesome exercise and lead them to feel the individual's responsibility both in the preservation of beautiful natural scenery and in rendering it accessible to others. Although nothing definite has yet been arranged, perhaps it is possible that something could be accomplished during the coming season, by the coöperation of one of these camps, both in the building of new paths and the construction of one or two more new camps where needed, the whole being done in accordance with the Club's plans for the extension and better organization of its system, — if the largely unrelated paths at present scheduled can fairly be thought to form in any true sense a system.

To advocate this better organization and more systematic disposition of paths, does not imply that every considerable ridge or valley should eventually have its through path, still less that every Club path should be maintained as a broad or graded way. There should certainly always be different standards for different paths, as advocated by Mr. Field, some preferably being kept always as rough trails. This will mean, too, that not all paths will be equally clear or easy for the uninitiated to follow, but every path or trail for which the Club is in any way responsible, should, so far as possible, be perfectly clear at every point for one

who is at all used to following trails, or who is reasonably intelligent and careful, and it is hardly necessary to add that a neat and noticeable painted sign should never be omitted for the sake of fostering a greater sense of remoteness from civilization, when the maintenance of such a sign is needed in order that a person of average intelligence and experience will have at no point any hesitation whatever as to the way.

It must be said that the extension of the lumber industry into new territory, notably in Waterville, on Jefferson and Adams, on the Carters and in the lower Swift River valley, as well as the enlargement of old logged areas, notably in Lincoln, render the future beauty of our paths quite uncertain. Though there is still hope of the solution of the present problem, — either in certain areas, by the adoption of more far-seeing forestry methods (the application of which it seems reasonable to expect in Waterville and Albany, and which has long been observable in Livermore), or for the whole region by the inauguration of national control, — it is yet probable that unusually careful judgments will have to be made by the Councillors of the next few years as to the timing of outlays, and special attention will henceforth have to be given to the constant marking, by path signs, of places obscured by logging.

Finally, there exists no complete, up-to-date guide to the White Mountains region, giving a concise description of all paths and camps, — such a guide, in short, as would be very useful to any one walking through a section of the mountains with which he is not familiar. As regards maps we are considerably better off, for not only has Mr. Louis F. Cutter issued a revision of his exceedingly valuable blue-print map showing the paths and camps on the northern peaks of the Presidential range and in the region about Randolph, but also the National Publishing Company, with the assistance of various members of the Club and others who have contributed information concerning the paths in their particular haunts, has issued a new map of the whole White Mountain region at the scale of two miles to the inch, upon which is recorded considerable information not hitherto appearing in a comprehensive scheme, and which is, all things considered, the most satisfactory map we yet have of the White Mountains as a whole. The demand is increasing

for a revision of Sweetser's, or some other White Mountain guide, or the compiling of an altogether new one, designed primarily for walkers, and giving less information about hotels and railroads and much more about paths, trails and camps. Pending the publication of such a walker's handbook, it is thought that the devotion of a part of each spring number of APPALACHIA to such concise accounts of Club paths, or other, or revisions of former accounts, as might be contributed by members and others, would be of special value, — each account stating little beyond the essentials sufficient, for instance, in the case of each path, first, to enable a man intelligently to decide whether he cares to walk over it, and second, to assure him, if desired, when walking over it, at what point he is on the path, and what features he has ahead of him which he ought not to miss seeing.

Bibliography of the Rocky Mountains and Selkirk Ranges : British Columbia and Alberta.

FOR the basis and principal part of the accompanying Bibliography the Club is under obligation to its corresponding member, Mr. E. Deville, the Surveyor-General of the Dominion of Canada, who some two years ago kindly placed his manuscript copy at the disposition of the Publishing Committee. Meantime numerous additions have been made to it from various sources. The request for its publication having been received from persons both within and outside the Club, it is thought best not to attempt to make it complete before presenting it, but to offer it as a contribution to a future exhaustive bibliography of the subject.

None of the earlier works are in our Club library. So far as appears, the Massachusetts State Library is the only one in Boston that possesses the Reports of the Department of the Interior (Canada). These can be consulted at the State House. Several of the most interesting monographs are to be found in the Boston Public Library, and the shelf numbers of these are here inserted with the initials B. P. L.

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1902. Collie, J. Norman, F. R. S. *Mountaineering on the Himalaya and other Mountain Ranges.* Edinburgh: Douglas. 8vo, pp. xii., 315, plates, maps. [Pages 136-163 treat of the Canadian Rockies.] B. P. L. 4003.156.

1902. Wilcox, Walter D. Recent Exploration in the Canadian Rockies. National Geographic Magazine, Vol. XIII., No. 5, pp. 151-168, 12 illust. 1 map; No. 6, pp. 185-200, 9 illust.
1903. Wheeler, Arthur O. Behind the Asulkan and Donkin Passes. APPALACHIA, Vol. X., No. 2, pp. 123-135, 5 illust. and sketch map.
1903. Outram, James. Climbs among the Highest Canadian Rockies. APPALACHIA, Vol. X., No. 2, pp. 142-165, 6 illust. — Some New Ascents in the Canadian Rockies in 1902. *Ibid.*, pp. 209-211.

A Correction.

IN affixing the titles to Plates IX. and XI. in No. 1 of this volume unfortunate substitutions occurred which should be corrected in copies that are to be preserved. In Plate IX. "1. The Chaba Valley" and "2. Up the Western Athabasca" should be reversed; in Plate XI. "1. From the North" should interchange with "2. From the South."

Report of the Recording Secretary for 1902.

ON January 1, 1903, the corporate membership of the Club was 1345. The losses during 1902 amounting to 73, and the accessions to 183, the net gain for the year was 110. The Honorary Members numbered 17, J. W. Powell having deceased; and the Corresponding Members 52, Jean Habel, James Outram, Gifford Pinchot, and Mrs. Fanny Bullock Workman having been elected and Jean Habel having deceased. There were 184 Life Members. The total membership was 1414, the net gain being 112.

There were held during the year 9 regular, 8 special, and one field meeting, the average attendance being over 200.

There were presented during the year, besides reports of officers and committees, 19 papers, 17 of which were illustrated with the lantern. Asia occupied the unusual number of five meetings, China and Siberia, the Philippines, Sumatra-India, and Palestine being the subjects. One evening was given each to Africa, South America, and Antarctica. The Canadian Rockies and New Hampshire had only one paper each, the same number as Oregon and New York. Naturally Mt. Pelée

had two evenings. Two evenings were given to flowers, two to irrigation, and one to the Club's outings. The most important meeting was that in which Sir Martin Conway described his exploration of the Baltoro Glacier and his ascent of Pioneer Peak in the Himalayas.

The Field Meeting was held at The Sagamore, Lake George, N. Y., June 27 to July 7. Professor A. B. Woodworth spoke on the local geology. Accounts of the Field Meeting and other excursions will be found in the report of the Excursion Committee.

The Camp at Three Mile Island, Lake Winnepesaukee, has been prosperous. A detailed report of the committee in charge has been submitted to the Trustees of Real Estate, and will be found appended to their report.

The Snow-shoe Section held its annual meeting in January. The membership is now 171, and there were three meets near Boston. A fourth time the winter excursion has been to the Iron Mountain House, Jackson, N. H. The attendance was 111, and the time February 15 to March 3.

The annual social meeting was held at the Hotel Vendome, on Friday evening, February 7, with an attendance of 254. A balance of \$36 was paid into the treasury.

One number of *APPALACHIA*, Vol. X., No. 1, was published in May.

Reference is made to the reports of the several Councillors for work accomplished in their various departments.

Through the influence of the Massachusetts Forestry Association, a tract of ten acres in Carlisle, Mass., on which are ninety-eight large pine-trees, was conveyed to our Club early in the year. Two additional gifts of real estate in the State of New Hampshire are reported by the Trustees. Thus the holdings of the Club now number ten, — eight in New Hampshire and two in Massachusetts.

The Council has voted, upon the recommendation of the Committee on the Sella Collection of Photographs, that henceforth the Collection shall be in charge of the Art Department.

Respectfully submitted,

ROSEWELL B. LAWRENCE,
Recording Secretary.

Report of the Corresponding Secretary for 1902.

THE Corresponding Secretary is pleased to report — as in former years — the continuance of cordial relations with many kindred societies in our own country and abroad, and the same gratifying increase in the library through exchanges with these correspondents. The number of these societies is 118, the same as last year, and the number of volumes received from them, about 125.

Besides the exchanges, 111 volumes have been added to the library, 10 of which were purchased, 58 were given by members and 23 by authors or publishers and others; 20 others — the missing volumes of Mr. Burt's paper, *Among the Clouds* — were secured from him at a price which makes them in part a gift; 288 maps have been acquired, 279 being those of the United States Geological Survey, of which 133 were received in exchange, 115 purchased, and 9 the gift of the librarian; the 9 other maps were prints of the different color sheets of the recently published map of central New Hampshire.

Of the gifts, the most important in many years is that of Mr. Nathaniel T. Kidder, in the name of his brother, Henry T. Kidder, recently deceased. The list of these (27 in number) comprises classic and recent monographs of alpine literature and guidebooks. Mr. C. W. Folsom has sent a number of guidebooks, early reports and railway folders. To accommodate the additions the fourth section of Wernicke cases has been placed in the reception room.

Work on the card catalogue has been continued during the year with much volunteer assistance. Thanks are especially due to Miss Anna E. Lanning for completing the analysis of the thirty or forty volumes of the publications of the American Geographical Society. She is now performing the same service for the volumes of the *Alpine Journal*. Miss Batchelder has continued to care for the periodicals during the greater part of the year. Within a couple of months Miss Martha Adams Vinal has been instructed by her and has assumed this part of the work, leaving Miss Batchelder more free for work in cataloguing and the care of the scrapbooks.

There has been a gratifying increase in the use of the library by members and special students.

The problem of room for the library in the present quarters is one that is never far distant from the librarian's mind. Some relief has been afforded by the storing of certain volumes, such as the Bulletins, Reports and Monographs of the United States Geological Survey, in the rooms of the Massachusetts Forestry Association, on the floor above us in the same building, where they are of service to students of forestry, and are perhaps more available to most of our members than in our own rooms, since the Forestry Room is open practically all the time.

JOHN RITCHIE, JR.,

Corresponding Secretary and Librarian.

Accessions to Library in 1902 other than by Exchange.

DONATIONS.

[Names of Members in Italics.]

- Alaska-Canadian Frontier. T. W. Balch.
 Alpine Memories. E. Javelle. (K.¹)
 Alpine Regions of Switzerland. T. G. Bonney. (K.)
 Alps and Sanctuaries of the Piedmont and Canton Ticino. S. Butler. (K.)
 Antarctica. *E. S. Balch*. Gift of author.
 Ascent of Mount Saint Elias. Filippo di Filippi. (K.)
 Atlantic Coast Guide. Gift of *C. W. Folsom*.
 Burt's Guide through the Connecticut Valley to the White Mountains and Saguenay. Henry M. Burt. Gift of Mrs. H. M. Burt.
 Chamonix and the range of Mont Blanc. *E. Whymper*. Gift of author.
 Charles Eliot, Landscape Architect. C. W. Eliot. Gift of R. A. Bullock.
 Chasing the Sun. R. M. Ballantyne.
 Climbers' Guide to the Adula Alps. W. A. B. Coolidge.
 Climbers' Guide to the Central Alps of the Dauphiny. W. A. B. Coolidge, H. Duhamel and F. Perrin.
 Climbers' Guide to the Chain of Mont Blanc. L. Kurz.
 Climbers' Guide to the Eastern Pennine Alps. *W. M. Conway*.
 Climbers' Guide to the Lepontine Alps. *W. M. Conway* and W. A. B. Coolidge.
 Climbers' Guide to the Mountains of Cogne. G. Yeld and W. A. B. Coolidge.
 Climbers' Guide to the Range of the Tödi. W. A. B. Coolidge.
 Climbing and Exploration in the Bolivian Andes. *W. M. Conway*. (K.)

¹ Gift by Nathaniel T. Kidder in the name of Henry T. Kidder.

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- Climbing on the Himalaya and other Mountain Ranges. *J. N. Collie.* Gift of author.
- Color Photographs of Scenes in the Southwest. Gift of *A. R. Bailey.*
- Dolomite Strongholds. *J. S. Davies.* (K.)
- Early Mountaineers. *F. Gribble.* (K.)
- First Crossing of Spitzbergen. *W. M. Conway.* (K.)
- Footing it in Franconia. *B. Torrey.* Gift of *A. D. Wilde.*
- Forest Trees having Commercial Value. *G. H. Wirt.*
- Gazetteer of Massachusetts. *J. Hayward.* Gift of *C. W. Folsom.*
- Geography, History, and Statistics of America and the West Indies. *H. C. Carey and J. Lea.* Gift of *J. Ritchie, Jr.*
- Geography on the Productive System. *R. C. Smith.* Gift of *C. W. Folsom.*
- Glimpses of the Grand Canyon of Arizona. *H. G. Peabody.* Gift of author.
- Guide to Zermatt and the Matterhorn. *E. Whymper.* Gift of author.
- Hours of Exercise in the Alps. *J. Tyndall.* (K.)
- Incidents in White Mountain History. *B. G. Willey.* Gift of *C. W. Folsom.*
- Kathlamet Texts. *F. Boas.*
- King's Handbook of Boston. *M. King.*
- List of Plants introduced into Andover in 1902. *A. H. Moore and A. S. Pease.* Gift of authors.
- Lovers of the Woods. *W. H. Boardman.* Gift of *A. D. Wilde.*
- Map of the Mer de Glace. *J. D. Forbes.* (K.)
- Mont Blanc. *P. Gussfeldt.* (K.)
- Mountaineering. *C. Wilson.* (K.)
- Mountains of California. *J. Muir.* Gift of author.
- My Climbs in the Alps and Caucasus. *A. F. Mummery.* (K.)
- My Home in the Alps. *Mrs. Main.* (K.)
- Notes on the Field-work of Photographic Surveying as applied to Canada. *A. O. Wheeler.* Gift of author.
- Oregon Trail. *F. Parkman.* Gift of *E. W. Howe.*
- Our National Parks. *J. Muir.* Gift of author.
- Path to Rome. *H. Belloc.* Gift of *E. E. Norton.*
- Peaks, Passes, and Glaciers. *J. Ball,* editor. (K.)
- Peaks, Passes, and Glaciers. 2d Series. 2 vols. *E. S. Kennedy,* editor. (K.)
- Physician's Holiday. *J. Forbes.* (K.)
- Pioneers of the Alps. *C. D. Cunningham and W. de W. Abney.* (K.)
- Playground of Europe. *Leslie Stephen.* (K.)
- Rapport sur les Variations des Glaciers Français. *W. Kilian.* Gift of Commission Française des Glaciers.
- Report upon the Forestry Investigations of the United States Department of Agriculture, 1877-1898. *B. E. Fernow.*
- Revue de Glaciologie. *C. Rabot.* Gift of Commission Française des Glaciers.

Schweizerische Bergbahnen. Gift of *N. A. Lindsey*.
 Sir William Martin Conway. *F. Steelcroft*. Gift of *A. Moore*.
 Story of Mont Blanc. *A. Smith*. (K.)
 Timber Resources of Nebraska. *W. L. Hall*.
 Tracks and Landfalls of Bering and Chirikof on the Northwest Coast of
 America. *G. Davidson*. Gift of author.
 Travels through the Alps of Savoy. *J. D. Forbes*. (K.)
 Twelfth Census of the United States, 1900, Vols. II.-VIII.
 White Mountain Guide-book. *S. C. Eastman*. Gift of *C. W. Folsom*.

PURCHASED.

Alps in 1864. *A. W. Moore*.
 Annals of Mont Blanc. *C. E. Mathews*.
 British Guiana. *L. Crookall*.
 Climbs of Norman-Neruda. Edited by *M. Norman-Neruda*.
 Constantinople. *E. de Amicis*.
 Flowers in the Pave. *C. M. Skinner*.
 Freedom of the Fields. *C. C. Abbott*.
 Great Divide. *Earl of Dunraven*.
 Handy Guide to Norway. *T. B. Willson*.
 Midsummer Drive through the Pyrenees. *E. A. Dix*.
 Mountain Playmates. *H. R. Albee*.
 Oriental Days. *L. A. Palmer*.
 The Pyrenees. *H. Blackburn*.
 Sketch of the Present State of the Island of Sardinia. *W. H. Smyth*.
 Travels in a Treetop. *C. C. Abbott*.
 Volcanoes. *G. Poulett Scrope*.

Treasurer's Report for 1902.

The receipts and payments for the year were as follows :—

RECEIPTS.

Cash on hand, Jan. 1, 1902, unappropriated	\$634.21
“ for Mt. Washington Refuge Fund	92.06
“ “ Eliot Memorial Fund	86.00
“ “ prepayment of subscriptions and dues	45.00
“ Bequest of Capt. Julius A. Palmer	225.00
	<hr/>
	\$1082.27
Life memberships, for Permanent Fund, 19 at \$30	570.00
Permanent Fund, interest on Delia D. Thorndike bequest	56.00
“ “ interest on balance of fund for 1902	209.46
Reserve Fund, interest for 1902	57.76

Annual assessments : 973 members at \$3	\$2919.00
Admission fees : 173 members at \$5	865.00
Real estate : sale of wood on Three Mile Island	96.00
Rooms :	
Rent of keys	\$142.25
Use of rooms	12.00
Donations for rooms	14.00
	168.25
APPALACHIA and other publications :	
Sales of APPALACHIA, maps, and books	\$52.30
" " Walks and Rides about Boston	150.87
	203.17
Department of Topography :	
From L. F. Cutter : sale of blue print maps of Northern Slopes	27.73
Field Meetings and Excursions :	
Received from Committee	\$50.00
Sale of Club pins and buttons . . . . .	.65
	50.65
Department of Exploration and Forestry :	
Donation from member	10.00
Department of Improvements :	
Donation from member	3.00
Annual Reception :	
Paid in by Committee	36.00
Donations :	
William Morris Davis, profit from geographical exhibition of Brooklyn Institute in 1891	37.15
Interest on bank account for 1902	32.39
Total unappropriated receipts for 1902	4448.34
	<u>6423.83</u>

PAYMENTS.

Trustees of the Permanent Fund :	
Bequest of Capt. Julius A. Palmer	\$225.00
Life memberships, 19 at \$30	570.00
	\$795.00
Trustees of the Reserve Fund :	
Interest on the Permanent Fund for 1902	\$209.46
" " " Reserve Fund for 1902	57.76
	267.22
Real estate :	
Interest on Delia D. Thorndike bequest, voted to erecting tower on Three Mile Island	56.00

TREASURER'S REPORT.

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Expenses of Trustees for 1902	\$51.72	
Cutting trees on Three Mile Island	95.16	
Burning refuse wood on Three Mile Island	96.00	
	<u> </u>	\$242.88
Rooms :		
Rent and care for 12 months	\$1500.00	
Electric light	30.64	
Fittings and supplies	73.92	
Insurance for three years	18.30	
Storage warehouse	25.95	
	<u> </u>	1648.81
APPALACHIA and other publications :		
Reprints	\$15.58	
Vol. X., No. 1	692.70	
Delivery	109.86	
Business agent	50.00	
Walks and Rides about Boston	15.85	
Edwin M. Bacon, royalty on same	17.20	
	<u> </u>	901.19
Stationery, Printing, and Postage :		
Club Register for 1902	\$226.98	
General expenses	457.15	
	<u> </u>	684.13
Library :		
Books	\$63.30	
Binding and sundries	92.28	
	<u> </u>	155.58
Expense of meetings	296.75	
Department of Topography	34.25	
Department of Exploration and Forestry	27.75	
Department of Improvements	284.49	
Department of Art	28.10	
Clerical services	287.00	
Donation to American Park and Outdoor Art Association's Convention in Boston	50.00	
	<u> </u>	
Total expenses		4640.93
Cash in bank Dec. 31, 1902 :		
Mount Washington Refuge Fund	\$92.06	
Eliot Memorial Fund	86.00	
Prepayments	44.00	
Cash unappropriated	442.62	
	<u> </u>	664.68
		<u> </u>
		6423.83
		<u> </u>

Respectfully submitted,

RUFUS A. BULLOCK,
Treasurer.

Report of Trustees of the Permanent and Reserve Funds for the year 1902.

PERMANENT FUND. — PRINCIPAL.

1902.

Jan. 1.	Amount on hand from last report	\$7403.95	
	Amounts received from R. A. Bullock, Treas., for Life		
	Memberships and Fund:—		
28	Miss Frances R. Morse	\$30.00	
"	Sumner R. Hooper	30.00	
"	Robert Farquhar	30.00	
"	Allen Chamberlain	30.00	
"	Mrs. Allen Chamberlain	30.00	
"	Harry C. Low	30.00	
"	Miss Helen Collamore	30.00	
"	Julius A. Palmer Fund		225.00
Apr. 26	Miss Agnes Godbald	30.00	
"	Wm. L. W. Field	30.00	
"	Josiah M. Kagan	30.00	
"	Charles C. Stevens	30.00	
"	Simpson C. Heald	30.00	
Nov. 27	Mrs. Delia L. Viles	30.00	
"	Mrs. George S. Wright	30.00	
"	Henry Stockbridge	30.00	
"	Frank H. Burt	30.00	
Dec. 27	Alexander Agassiz	30.00	
"	Isaac O. Rankin	30.00	
"	Mrs. John T. Prince	30.00	
			570.00
	Total Principal on hand January 1, 1903.	8198.95	

PERMANENT FUND. — INTEREST.

1903.

Jan. 1.	Suffolk Savings Bank : 12 months, to Oct., 1902	\$35.55
"	Provident Institution for Savings : 12 months, to July, 1902	51.26
"	Lexington Savings Bank : 12 months, to Oct., 1902	37.71
"	Eliot Five Cents Savings Bank: 12 months, to Oct., 1902	30.92
"	Franklin Savings Bank : 12 months, to Aug., 1902	26.11

TRUSTEES OF PERMANENT AND RESERVE FUNDS. 195

"	Boston Five Cents Savings Bank : 12 months, to Oct., 1902	17.78	
"	Institution for Savings : 12 months, to Oct., 1902	36.00	
"	Canton Institution for Savings : 12 months, to Oct., 1, 1902	30.13	
"	Interest accrued during year	<u>265.46</u>	
18	Paid R. A. Bullock, Treas., as per vote of Council, accrued interest on Delia D. Thorn-dike fund for two years	\$56.00	
29	Paid R. A. Bullock, Treas., as per vote of Council, accrued interest during year . . .	209.46	
		<u>265.46</u>	
1902.			
Dec. 31.	Total Principal on hand	\$8198.95	
	Deposited as follows :—		
	Suffolk Savings Bank, Book No. 100,753 . .	\$1120.80	
	Provident Institution for Savings, Book No. 118,265	1503.83	
	Lexington Savings Bank, Book No. 1921 . .	1106.14	
	Eliot Five Cents Savings Bank, Book No. 32,233	907.21	
	Franklin Savings Bank, Book No. 70,143 . .	935.77	
	Boston Five Cents Savings Bank, Book No. 425,754	521.81	
	Institution for Savings, Roxbury, Book No. 80,803	1000.00	
	Canton Institution for Savings, Book No. 9015	<u>1103.39</u>	
			<u>\$8198.95</u>

RESERVE FUND. — PRINCIPAL.

1902

Jan. 1.	Amount on hand from last report	\$1683.74
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RESERVE FUND. — INTEREST.

Dec. 31.	Boston Five Cents Savings Bank, 12 months, to Oct., 1902	\$48.34	
"	Massachusetts Loan and Trust Co., 12 months, to Jan., 1903	9.42	
	Interest accrued during year, added to prin-cipal	57.78	
	Amount interest on Permanent Fund per vote of Council	209.46	
	Total Reserve Fund on hand Jan. 1. 1903	<u>1950.96</u>	

Deposited as follows :—

Boston Five Cents Savings Bank, Book 229,173	\$1417.89
Canton Institution for Savings, Book 10,793	218.88
Massachusetts Loan and Trust Co.	314.19
	<u>\$1950.96</u>

1903.

Jan. 1. Total Permanent Fund	\$8198.95
“ “ Reserve Fund	1950.96
“ “ in hands of Trustees	<u>\$10,149.91</u>

CHARLES H. FRENCH,	} Trustees of the
ISAAC Y. CHUBBUCK,	
REST F. CURTIS,	
	} Permanent and
	} Reserve Funds.

The committee appointed to examine the accounts of the Appalachian Mountain Club respectfully report that they have examined the accounts of the Treasurer for the year 1902, and believe the same to be correct. Proper vouchers were shown for all payments, cash on hand verified, same amounting to \$664.68.

We have also examined the accounts of the Trustees of the Permanent and Reserve Funds, and find them to be correct. The Permanent Fund shows a balance of \$8198.95, and the Reserve Fund amounts to \$1950.96.

Investments as reported by the Trustees have also been verified.

Some minor changes have been suggested in the methods of keeping the accounts of the Trustees, which we believe have been accepted by that Board.

C. L. BURRILL,	} Auditing
ALBERT E. DUFFILL,	
FREDERIC W. STONE,	
	} Committee.

Boston, January 9, 1903.

Report of the Trustees of Real Estate for 1902.

The Trustees of Real Estate respectfully report :—

The Lead Mine Bridge Reservation gains yearly in beauty from the growth of the trees and bushes ; and it is difficult now to realize how unsightly it was when we took possession. It is visited more and more every year, both for its own attractions and for the magnificent view it commands of Mts. Madison and Adams.

The paths from the Randolph Reservation to the mountain summits, and the attractiveness of this whole region, are threatened seriously by the large lumbering operations begun upon the slopes of Mts. Jefferson and Adams. Members of the Board have visited Berlin, and the lumber camps upon the mountains, in each of the months of September, October, and

November. We also are represented in all three of the bodies which are trying against heavy odds to have something upon Mts. Adams and Madison saved from speedy destruction.

The dam upon the Joseph Story Fay Reservation has been repaired, and a light rustic bridge has been built to the island. The view from the bridge is one of the prettiest and most picturesque in New England, and the Reservation is visited every year by hundreds of people. Notwithstanding our notices, the balsam firs upon the Reservation are broken and stripped every autumn by the summer boarders and others, to get the tips for pillows.

Under the direction of a committee appointed by us, consisting of Messrs. Pray, Chamberlain, and Edmands, the Madison Hut and surroundings have been put into good order at an expense of \$100.62 out of an appropriation by the Council of \$150 for this purpose. The increasing use of the Hut for objects other than those for which it was built, and sometimes objectionable ones, gives us serious concern.

Three Mile Island and the Camp remain in charge of the committee appointed by the Trustees, and their report to us is annexed hereto. We have considered the question of another name for the Camp, and have come to the conclusion that at present it is inexpedient to make a change. In compliance, however, with a request from the Council we have named the new tower upon the island "The Thorndike Tower" for our deceased member, Mrs. Delia D. Thorndike.

The building upon Pack Monadnock Mountain has been put into good repair; but we were unable to arrange for its occupation by a tenant, except at an expense and a risk to the Club which we were unwilling to incur.

The Reservation upon Mt. Grace in Warwick is not visited by many members of the Club, owing to the remoteness of the town, but almost daily from early spring till late autumn by the people of Warwick and the surrounding country.

The holdings of the Club have been increased during the year by gift from the Massachusetts Forestry Association of the Carlisle Pines; and by gift from Carolin E. Clay, widow of Ithiel E. Clay of Chatham, of ten acres of land upon the extreme top of Baldface Mountain and of ten acres of land upon

the extreme top of the Northern Kearsarge Mountain, both in the town of Chatham in the State of New Hampshire, with a right of way to each.

We received also from the Massachusetts Forestry Association the sum of \$100 for the care of the Carlisle Pines. Much dangerous brush and wood has been burned at an expense of \$25 paid from an appropriation to the Department of Exploration and Forestry, and a survey was made in April. We sent a communication to the Massachusetts Forestry Association expressing our gratitude for the public spirit of the Association in obtaining the money for the saving of the Pines and of our appreciation of its kindness in having the conveyance made to the Club. By request of Mr. James H. Bowditch, and at his expense, the land around the base of the biggest pine has been cultivated in order to determine whether such care will be of special benefit.

Another considerable area of woodland within our own State has been offered to us, but it was not accepted, as we feel that only such lands should be held as are likely to be used.

It would be of great assistance to us if a small maintenance fund could be raised by subscription so as to enable us to care for such desirable tracts as are offered to the Club, without imposing a burden upon its ordinary revenues.

For the Board of Trustees,

HARVEY N. SHEPARD, *Chairman.*

REPORT ON THREE MILE ISLAND.

To the Trustees of Real Estate: —

During the year 1902 considerable work was accomplished at Three Mile Island, decided improvements were made and the summer camping party was a great success.

There was upon the island a large amount of poplar, — an inferior, short-lived tree. The Committee were satisfied that a considerable portion of this growth should be removed, in order to give the evergreens and hardwoods a better opportunity. During the winter of 1901-2 about fifty cords of this wood were cut, some of it was used at camp, and the remainder sold, the receipts being utilized to pay for labor in cleaning up the brush left from the cutting. The Committee

realize the exceeding difficulty of carrying through such work without injury to the property, but, in spite of some criticism, they are perfectly confident that the island has been vastly improved in value and attractiveness, and that in the not distant future all members will commend the Committee's foresight and judgment. In connection with this work a trail has been laid out around the island near the shore, and the paths from the Camp to the various tent sites have been improved.

In May the boathouse was enlarged according to its original design, and is now capable of housing twelve boats and canoes. A dory, picked up at sea by two Club members, has been presented to the Camp, and Mrs. Allen Chamberlain has also presented a fine St. Lawrence skiff, so that the Club now owns four boats. There are also in the boathouse one boat and four canoes belonging to Club members.

A serious problem has been the water supply at the Camp. Although the water of Lake Winnepesaukee is known to be exceptionally pure, and is used by many camps and the city of Laconia, yet some members object to its use. The labor of carrying it to the Camp is also expensive. It has been decided, therefore, to have a well and pump the water by means of a hot-air engine into a tank, thus obtaining a good head of water at the Camp. The well is partly done, and a fine supply of water from a crevice in the ledge is assured. Next spring the well will be finished, a stone curb built, and a windlass put in, a board cover being provided for use when the Camp is not occupied.

Upon the height of land in the rear of the Camp, and not far from the well, a tower has been constructed, chiefly for observation, and, incidentally, to contain the water-tank. The ground floor, measuring twenty by twenty feet, will be used for lockers and storage purposes. The second floor will afford, besides stairs and passageway, a large room, and the third floor two small rooms. Upon the fourth floor will be the tank and one small room. The fifth floor is tinued, and is furnished with a railing. A staircase leads thence to the sixth, or top, floor, where seats are provided on three sides. This floor is forty feet above the ledge and is twelve feet square; the peak of the roof is about fifty-four feet above the ledge and one hundred and two feet above the lake. The tank floor is forty feet above the floor of the camp, seventeen feet above the ridgepole, and seventy above the lake. Only the top story shows above the trees, and, being in design like the look-out on the Camp, is not a disfigurement to the landscape.

It is needless to say that the tower commands an extensive and beautiful view. On the east, almost at one's feet, lies the beautiful Hawk's Nest; to the west, and further away, the Beavers; to the

north the lake extends three miles to Centre Harbor; while to the south the great body of the lake stretches away thirteen miles. Between Red Hill and Ossipee we see the fine Sandwich Range, — Passaconaway, Whiteface, Pausus, and Chocorua, — while hardly less beautiful are Copple Crown in the southeast and the twin peaks of Belknap in the southwest.

During the season nine tents, measuring ten by twelve feet, were purchased, and one of the same size was presented by Mr. F. O. Worthley. Two platforms were built, $9\frac{1}{2}$ by $9\frac{1}{2}$ feet, and two tents of that size purchased. Mr. W. R. Chester presented the Camp a settle; Mrs. Chester, a Navajo blanket; Mrs. N. H. Brown, a clock; Mr. J. Ritchie, Jr., a rug, two pairs of blankets, and four map frames; Mr. C. D. Tucker, two dozen plated dessert spoons; Mr. A. S. Lynde, two inkstands, four pads, trays, etc.; Mr. G. W. Bunker, three cots; Mr. W. P. Fiske, a hammock; Mr. J. A. Crosby, a banquet lamp and a piano lamp; Miss A. M. Patterson, a rug; Misses L. A. and H. L. Jones and H. W. Poor, sofa pillows; Mr. E. W. Howe, a yoke for water pails; Mr. A. D. Wilde, apple slicer and knife trays. Additional cots, pads, table ware, etc., were also purchased. To his last year's gift of shrubs and trees, Mr. H. P. Kelsey has added about fifty vines.

An insurance of \$500 for three years has been placed upon the tower, and the total amount of insurance now carried is \$2700.

The Camp was open from July 15 to September 2, and during this time 94 members and friends enjoyed its hospitality. The largest number present at one time, August 9-11, was 39. In addition to the summer season, the camp has been visited by members at other times, making a total of about 140 different persons.

The improvements planned for the coming season are the completion of the well, the purchase of a hot-air engine, the piping for the water, some work on the drainage, and possibly the removal of some rocks near the boathouse and at the bathing beach. Two or three hundred dollars will be needed for those purposes, and contributions from members will of course be welcomed.

The Committee expect to have the Camp open next summer for a longer period, the charges being the same, \$1.50 per day and \$9.00 per week. At other times, members can obtain the use of the camp by consulting the Committee, the charge for rent being twenty-five cents per day for each person, with a minimum of \$2 per day or \$10 per week for a party. Respectfully submitted,

ROSEWELL B. LAWRENCE,

for the Committee in Charge.

FINANCIAL REPORT ON THREE MILE ISLAND AND CAMP, 1902.

RECEIPTS.

Balance on hand, Jan. 1, 1902. See APPALACHIA, X., p. 75 . . .	\$30.02
Net proceeds from lecture course	136.50
Net proceeds from sale of books	10.50
Use of Camp, Jan. 23-30	13.45
" " May 30-June 2	13.55
" " June 6-16	15.00
" " October 10-13	9.50
" " October 17-27	26.27
Rent of lockers	4.00
Storage and painting of canoes, 1901 and 1902	23.00
Profit on sale of wood	15.00
Subscriptions for improvements:—	
J. W. Manning, 25; R. B. Lawrence, 25; C. F. Peirce, 25; W. Coffin, 25; J. Ritchie, Jr., 10; F. O. Worthley, 10; A. S. Lynde, 10; W. S. Hunt, 10; H. C. Parker, 10; Mary W. Eastman, 10; L. E. K. Robson, 10; R. A. Bullock (for well), 10; Mary A. Coe (for forestry), 10; M. A. Knowles, 10; J. H. Whitman, 10; S. F. Whitney, 10; E. W. Howe, 10; C. N. Mason, 7.50; Agnes W. Lincoln, 5.50; C. Larned, 5; Allen Chamberlain, 5; F. H. Matthews, 5; John Robson, 5; F. V. Fuller, 5; A. M. Butler, 5; G. M. Jones, 5; H. P. Kelsey, 5; H. P. Curtis, 5; Mary Waterman, 5; W. L. Haskell, 2; Ella S. Wales, 2; F. E. Morse, 3; A. Moore, 2; N. A. Lindsey, 1; W. S. Rumrill, 1.	
Income of "Delia D. Thorndike" Fund	56.00
	<u>\$656.79</u>

PAYMENTS.

Town of Meredith, tax for 1902	\$23.04
New Hampshire Fire Insurance Co., tower	10.00
Fred H. Piper, forestry work	10.00
Ralph N. Piper, forestry work	10.00
James P. Leighton, contract for tower	560.00
J. F. Beede & Co., dynamite, etc., for well	3.12
Bickford & Brown, labor and materials, painting tent floors and boats, cutting wood	34.56
	<u>\$650.72</u>
Balance on hand	6.07
	<u>656.79</u>

Reports of the Councillors for the Autumn of 1902.

Natural History.

BY HARLAN P. KELLEY.

As in the preceding year the attention of the Councillor has been confined to the Club's recently acquired Reservation on Three Mile Island.

Several visits were made during the winter and spring, to carry on the work of clearing the island of underbrush and dead wood, and thus to prevent the destruction by fire of the beautiful growth of trees with which it is now covered, and to make room for the fuller development of the hard-wooded and ever-green species.

Each year it will take more thought and care to preserve just the right trees and thin out the weakly and undesirable ones. The covering of the island being mostly if not all "second growth," it was, as is usual under these conditions, entirely too thickly set by nature to allow of any normal development of the trees, either individually or in groves. Much of the rapid-growing and short-lived poplar, which served as a protection and shelter for the hard woods and pines when they were too small to care for themselves, having more than passed its usefulness, has been carefully thinned out, and the tops burned to prevent possibility of fire. Great care should still be used in dry times to prevent the escape of fire from the camps.

It is also hoped that as the Camp is more and more used the greatest care will be taken to preserve the natural aspects of the trees, shrubs and flowers which are easily destroyed by what I might call a too close communion with nature.

A number of native, rapid-growing vines have been planted where needed around the Camp, including Wild Grape, Climbing Bittersweet, Virginia Creeper and White Clematis.

Complete check lists of the fauna and flora of the island would be extremely interesting and valuable. This work is in progress, and the help of all those who make a trip to the island is earnestly requested.

The native plants planted on the island the previous year are becoming thoroughly naturalized, the White Rhododendron

maximum, the Azaleas and other shrubs and herbaceous plants blossoming during the season and setting buds for a greater display the coming summer.

Reports of the Councillors for the Autumn of 1902.

Topography.

By FREDERIC ENDICOTT.

THE present report covers the years 1901 and 1902, no report having been made by the Department last year.

In December, 1901, a beginning was made upon a map of Three Mile island, but a rainstorm which threatened to break up the ice caused a hasty retreat of the surveying party to the main land and home. A month later the work was resumed and the outline of the island was finished. Rock island, about a quarter of an acre in area, which is also the property of the Club, and Hawk's Nest and Nabby, our very near neighbors, were included in the survey. The map shows the lines of the several parcels acquired by the Club, with the position of the buildings, the path through the island, and many of the rocks perilous to local navigation. A tracing of the map has been prepared and some blue prints made from it. The Councillor wishes to acknowledge his indebtedness to his enthusiastic volunteer assistants in the work.

On Patriots' Day a camping party under the direction of the Trustees of Real Estate made a survey of the Carlisle Pines property and the ways leading thereto; the boundaries of the Club's property being the province of the Councillor of Topography, and the rest of the work, including the drawing of the map, being done by Mr. E. D. Fletcher, of Winchester. The tallest pine was found to be 122 feet in height.

Mr. E. G. Chamberlain has continued his very valuable topographical work, his view from Bunker Hill Monument appearing in Vol. X., No. 1, of APPALACHIA. The view from Doublet Hill has also been printed, and will be very useful after the close of the present bituminous era—the smoky result of the recent coal strike. At the request of your Councillor, Mr.

Chamberlain has kindly given the following summary of his work:—

AUBURNDALE, Dec. 6, 1902.

MR. FREDERIC ENDICOTT, COUNCILLOR OF TOPOGRAPHY:

DEAR SIR: Several years ago I turned in my Charles River survey in the form of nineteen blue-print sheets. In 1901 I revised the sheet of "Newton Lower Falls to Waltham," which covers more than a dozen A. M. C. outing routes. This was loaned to the editors of the Charles River Canoeist, who printed it in their issue of May 31, 1901. I also made a map of the whole river by reducing the nineteen sheets by pantagraph to a scale of 1 : 60,000 and copying on one sheet. This I loaned to the Canoeist, and it was printed on one half that scale in the issue of Aug. 31, 1901, as "the only accurate map of the river ever published." The section from South Natick to Riverside, twenty-six miles, being of special interest to some of our Club members, I constructed in the same manner a map of the region on a scale of one thousand feet to the inch. This also was loaned to the Canoeist, and printed on two fifths that scale in the issue of Sept. 27, 1902. In this map was incorporated a quantity of material obtained on the Saturday outings.

Much time has been given to the revising of the little panoramic view-guides and to enlarging them to a uniformity with the Ram's Head and Prospect views. Bunker Hill Monument view was completed in 1901, and Doublet hill and State House cupola in 1902. I had hoped to present Wachuset this year, but have been disappointed. In 1901 I worked three days on the summit observing angles and revising sketches, and also spent one day each on Mt. Tom, Mt. Grace, Pearl hill in Fitchburg, and Walnut hill in Orange, determining by triangulation points seen from Wachuset. Also many days were spent in computing azimuths of objects to be looked for. I now have the computed bearings of nearly three hundred objects, most of which I expect to observe from Wachuset when circumstances favor. The Mt. Wachuset guidebook I long ago found to be very unreliable. Of the nineteen New Hampshire mountains pointed out, one is doubtful, six are correct, and *twelve are wrong*. The mountain described as Washington is really Whiteface. I long ago proved mathematically from the known positions and altitudes that Washington would appear over the left of Whiteface and higher than it. After years of waiting I was rewarded Oct. 1, 1901, by seeing Washington overtopping Whiteface and at the point predicted. Another vexed question was settled at the same time. The "Moosilauke seen over the peerless Kearsarge" and "between Temple and Pack Monadnock" proved, as I knew it would,

to be two summits of the Lafayette group seen between Pack Monadnock and Lyndeboro mountain.

It is interesting to note how the study of one view point assists another. While studying the panorama from Powow Hill, the north-eastern watch-tower of Massachusetts, I determined by triangulation the positions of the little known mountains of southeastern New Hampshire. This enabled me to compute their azimuths from Wachusett, and by simply turning off the proper angles, those summits appeared unmistakably in the telescope.

During these two years I have mapped out, while with the parties, the routes of twenty-five outings. These I have issued in blue print form as souvenirs. They may enable members to correctly place on the published maps some points of interest never before shown. This was my primary object in making these "surveys."

Respectfully,

E. G. CHAMBERLAIN.

The net receipts from the sales of Mr. Louis F. Cutter's revised map of the northern slopes of Mts. Madison, Adams, and Jefferson for the last two years amount to \$27.73.

It may be proper to notice in this report (although it is not a Club work) that the National Publishing Company issued in the early summer of 1902 a map of convenient size including upon one sheet the White Mountain Region and Lake Country of New Hampshire.

Reports of the Councillors for the Autumn of 1902.

Art.

BY L. LOUISE TARBTON.

THE first event of the year 1902 in the Department of Art was at the "At Home" of the Room Committee on January 13, when Miss Agnes Leavitt exhibited her water-color sketches of scenes in the High Alps. The collection entirely filled our walls and proved very attractive, both on this occasion and also for the week following.

At the Annual Reception of the Club at the Vendome on February 7, the exhibition was in charge of Miss Helen E. Endicott, and comprised a fine collection of large photographs of South America, loaned by the Harvard College Observatory;

some photographs of the White Mountains by Mr. Alexis H. French; photographs of the Canadian Rockies by Mr. George M. Weed; views of the White Mountains by Mr. C. E. Lord and Mr. F. E. Endicott; and other pictures loaned by Mr. R. A. Hale, Mr. G. A. Nelson, Miss Penfield, Mr. E. B. Draper, Mr. E. L. Homer, Mrs. Carson, Mr. Jackson, Mr. Edward Whymper, and others.

Our next exhibition was at the President's "At Home" on May 19. Miss Pollock very kindly obtained for us a very fine collection of polychromes from the Detroit Photographic Co. These were all views of American mountains, some of the larger and more noticeable being Mt. Shasta from Sisson's; the Yosemite from Artist's Point; the High Sierras from Glacier Point; Falls of the Yellowstone; Grand Cañon of the Colorado; Gateway to the Garden of the Gods; Upper Twin Lake; summit of Pike's Peak; Marshall Pass and Mt. Ouray; Royal Gorge, Cañon of the Arkansas, Colorado; the Teton Range, Wyoming; and many smaller views.

After Mr. C. H. Ames's lecture before the Club, giving an account of his trip with the Mazamas up Mt. Hood in 1901, a number of photographs and amusing sketches, loaned by the Mazamas through Mr. Ames, were shown at the Club-room for a week or more.

The photographs shown at the reunions of the Snow Shoe party and the fall trip to Crawford's have also been left hanging in the Club-room for several days after the exhibitions, for the enjoyment of those visiting the room.

In August the Club-rooms were open for the use of the members of the Outdoor and Park Association during their meeting in Boston, and the Sella views of the Himalayas were on exhibition; also some fine views of the Carlisle Pines, by Mr. French.

Among the gifts to the Club were six large photographs of the Selkirks from Mr. Arthur O. Wheeler of Calgary, a member of the Club; later, twenty-three more were received from him, which we have had mounted to form an album. Mr. Walter L. Chaloner gave to the Club his charming water-color view of Three Mile Island, framed; and another water-color of Rock Island, near Three Mile Island, framed, was given by the artist, Miss Sara Stone. These have been hung upon the

Club-room walls. Two views of Speckled Mountain, Grafton, Me., were also received.

The department has had an enlargement made from Mr. Vaux's beautiful photograph of Mt. Sir Donald in the Selkirks, and it has been framed and hung in the Club-room; hanging, as it does, beside a large photograph of the Matterhorn, which it so strongly resembles, we can feel a very justifiable pride in this American mountain.

Mr. A. H. French has added a number of his beautiful photographs of the White Mountains to the special album kept for his views. We have received two stereoscopic views from Miss Adelaide Pierce: one, a view of the old Summit House, Mt. Washington, and the other a view of the Flume, Franconia Notch, before the boulder fell.

The card catalogue of the photographs of the Club is being continued.

Reports of the Councillors for the Autumn of 1902.

Exploration and Forestry.

By ALLEN CHAMBERLAIN.

THIS year's work in the field of Exploration was again in the Canadian Rockies. The Club was represented by Mr. George M. Weed, associated with Dr. J. N. Collie, and by Rev. James Outram, another of its corresponding members.

Dr. Collie's party operated in late July and August from Laggan as a base. Its first trip was to the north, where they ascended Mt. Murchison with an altitude of about 11,000 feet; Mt. Freshfield, about 10,800 feet; Mt. Forbes, about 11,700 feet; Howse Peak, about 11,000 feet; and an unnamed rock peak of about 11,000 feet, on the east side of Bear Creek. They explored the Lyell glaciers at the foot of Mt. Lyell on the south side of the peaks, and incidentally climbed two subsidiary peaks thereof about 10,000 feet or more of altitude. On returning to Laggan the party struck south into the valley of Moraine Lake, which is the second valley south of Laggan, and climbed the peak numbered 9 on Mr. Allen's map of ten peaks. This peak had an estimated elevation of 10,000 feet.

This Department was able to assist in this work by the loan of scientific field equipment. In this connection the Councillor would recommend that all instruments in the keeping of this Department should be examined and tested by an instrument maker, and everything put in a state of complete repair and adjustment before another field season.

The instruments and other field equipment now in the keeping of this Department are as follows:—

1 Watkin mountain aneroid barometer (in leathern case with string); 1 Höttinger aneroid barometer (morocco case); 1 prismatic compass (in box); 1 surveyor's compass (in bag); 1 bracelet compass; 1 pocket sextant and case; 1 pocket level and case; 1 clinometer and case; 1 pocket thermometer in nickel case; 1 graduated scale of degrees; 1 Zeiss field glass and case; 1 ice axe and case; 1 large rucksack; 3 alpine ropes; boot kit, (including 1 pegging last, 2 awls, 1 hammer, $\frac{1}{2}$ package Swiss boot nails).

An effort has been made this year by the Councillor to investigate some of the best grades of concentrated and condensed foods now in the market. A well-selected list of tested foods of this nature would probably prove of service to our exploring parties, and even to those of our membership who make less ambitious journeys afoot into the woods and mountains. A light pack and a well-filled stomach add wonderfully to the enjoyment of a tramp. Samples of foods of various natures have been procured and tested by the Councillor. Later it is hoped that a list may be issued giving such information as the following: name of the article, its nature, how packed, dimensions and weight of package, amount of food per package, price.

As the Councillor of this Department is also *ex officio* a member of the Board of Trustees of Real Estate, some of his work has been in connection with our various reservations, for a record of which reference is most respectfully made to the report of the Trustees.

The Department has also assisted, with the consent of the Council, and with the aid of a special committee of that body, in defending the "Tree Warden Law," so-called, from a second attack in the State Legislature.

The effort that is being made to preserve in some suitable

manner certain forested areas in the White Mountains has been closely followed by this Department, meetings of those interested have been attended, and the Council and Trustees of Real Estate kept informed as to the progress of the movement.

The Councillor regrets that it became necessary for him to leave early in the winter for a somewhat extended stay in the West, thus being obliged to drop some of the Department work at a time when it was becoming most interesting.

SOME NEW ASCENTS IN THE CANADIAN ROCKIES IN 1902. BY
JAMES OUTRAM.

1. *Mt. Columbia* (alt. c. 12,500 ft.). July 19. C. Kaufmann and J. Outram.¹

2. *Mt. Lyell* (alt. c. 11,900 ft.). July 24. By the same.¹

3. *Unnamed Peak* (alt. c. 10,200 ft.). July 30. " " "

From camp above the outlet of Glacier Lake four and a half hours, mostly trailless, to bivouac near end of Lyell Glacier. Thence start at four A. M. to glacier (4.30), crossed to unnamed glacier from southwest (5.20), followed up its centre to ice-fall, and back to ice after half an hour ascent of rocks, etc., on left bank (6.50). Then steered for the base of the snow peak right in front, the névé being badly crevassed and soft. Halt for breakfast at base 8.25 to 8.55, and continued straight up steep face to southeast ridge, following it to junction with northeast spur, by which the climb was finished. The last part was excessively steep on hard frozen snow, requiring step-cutting, and, on the return, a descent backwards. On summit 10.45 to 12.25. View very fine and specially interesting on account of the close proximity of Mt. Forbes throughout the route, the strangely erratic course of the watershed, and the opening up of a new section of the valley system to the West. Return by same line, with long halts for photographs, to end of glacier in four hours. Thence to camp five hours more.

4. *Mt. Freshfield* (alt. c. 10,900 ft.). August 4. With Professor Collie's party.

5. *Mt. Forbes* (alt. c. 12,500 ft.). August 10. With Professor Collie's party.

6. *Unnamed Peak* (alt. c. 11,200 ft.). August 19. C. Kaufmann and J. Outram.¹

7. *Unnamed Peak* (alt. c. 10,300 ft.). August 19. By the same.¹

8. *Mt. Bryce* (alt. c. 11,800 ft.). August 21. " " "

¹ See paper on "Climbs in the Highest Canadian Rockies," p. 142.

9. "*Query*" Peak (alt. c. 11,750 ft.). August 23. By the same.

We set out at 5.15, and, taking a fast gait, reached the high glacier col in less than five hours. Crossing the pass, we traversed an expanse of *névé*, close under the rocks of the sharp ridge. Soon we arrived at a small nick in the long spur of "Consolation Peak" that separates the glacier just crossed and its deep sequent valley from a larger amphitheatre of ice, walled in by rugged cliffs, above which rose "Query" Peak and its miniature. This glacier, with one or two minor ones, supplies another stream, which, sweeping westwards, with the waters from the previous valley, forms a tributary of the river flowing from Thompson pass. Descending into the great basin, we traversed its ruddy surface to the base of the long, easy back of our peak. Here on another little col we stopped for lunch at 11.15, and enjoyed the grand sweep of yet another new, glacier-headed vale, stretching from Mt. Lyell and its southwest spur right to our feet, and trending to the South Fork of the Bush River. Nearly an hour was spent here, after which 80 minutes of easy climbing, chiefly over snow of a fair steepness, took us to the top at 1.30.

10. *Mt. Wilson* (alt. c. 10,900 ft.). August 26. By the same.

Starting from an old Indian camping-ground opposite the West Branch valley at 4.45, an hour's distance down the North Fork brought us to the outlet of a narrow and lofty valley north of the massif of Mt. Wilson. A steep scramble of 1000 feet along the line of a barely indicated Indian trail brought us to an upland valley, whose slopes were traversed to the foot of a fine waterfall that leaps from the crest of a transverse wall of rock, some 300 feet in height. Crossing to the left bank (a very troublesome job), we climbed the barrier, traversed a barren valley, and ascended a long ridge running northeast from the northern peak of the massif. The opposite side was chiefly sheer, but we found a possible place to descend to the large glacier below. A half hour was spent at breakfast on the arête, and fifty minutes in climbing down 300 feet. Gaining the glacier at 11.15, it was ascended to its head (12.30), between Mt. Wilson proper and the north peak, and a grand view to Mt. Lyell was obtained, as we stood above a tremendous gorge, walled in precipitously on either side. A traverse on snow and *débris* led to the northeast spur of our mountain, and, keeping along its crest, at two P. M. we reached the summit. On it we built our first cairn! No other peak except the one ascended in the dark had stones upon its top. The view was specially interesting from its extent and the fact that our seven weeks' wanderings could be traced as on a map from this point of vantage. A descent over soft snow and a fine bit of rock-work, undertaken to

avoid the dangers of an abominably crevassed glacier, terminated in our arrival at a sharp little nick in the southern impregnable wall at 4.30, almost two hours from the summit. Another half hour was occupied by lunch, and then we romped down the steep gully of scree and grassy slopes (2500 feet in twenty-five minutes), from which point a tedious tramp ensued, through tall grass and underbrush, forests and dense thickets, all strewn with fallen logs, both large and small, burnt and decayed, till our camp on the banks of the Saskatchewan was reached, at 6.40.

Reports of the Councillors for the Autumn of 1902.

Improvements.

By JAMES STURGIS PRAY.

EVERY path and camp for which the Club was assuming any responsibility has directly or indirectly received the attention of the Councillor; and at the close of the season (indeed, for the most part, by the 4th of July), with the exception of three paths, the condition of each was reported as brought up to the A. M. C. standard of excellence established for that particular path or camp. Including the new Swift River Trail, approximately seventy-eight miles of path have thus been gone over during the season. The year's expenditures have amounted to \$204.64.

In the case of each of the three paths not cleared, namely, those known as the Jackson Carter Notch Path, the Mt. Willey Path, and the Mt. Liberty Path, the Councillor made arrangements in the early spring for its being cleared, and supposed the work had been done. When he received word to the contrary, the season was so far advanced that, even had it been possible to secure men for the work, it was too late, in his judgment, to warrant the necessary expenditure for the few weeks of likely use remaining, since the ground would again have to be gone over in the following spring.

At the beginning of the season's work it was found that the previous winter's storms — particularly a severe ice-storm in December — had wrought greater havoc than for many years upon most of the Club's paths and camps, especially in the region about Randolph.

The Councillor, though unable to devote as much time as he had hoped to personal inspection and direction in the field, has made two trips to the White Mountains, the first in June, and the second in August and September. The first included the superintendence of the repair of the Madison Spring Hut, conferences with the Lowes and others regarding the clearing of paths, the inspection of some of them, and the laying out of the new Swift River Trail, which forms the subject of a special paper.¹ The second trip covered the inspection and repair of the Twin Mountain Path and trail, the inspection of the American Institute of Instruction Path and the Swift River Trail, and the exploration of the latter's possible future extension into Lincoln.

PATHS ON MADISON, ADAMS AND JEFFERSON.

Besides the repair of the winter's damage on all these, the lower part of the Air Line Path was mowed, and its upper part and the part of Lowe's Path to Mt. Adams, above the timber, marked by additional cairns, needed for greater clearness and safety in thick weather. The work on all these paths was done by T. S. and V. D. Lowe, assisted on some by T. C. Milner, — all of Randolph.

The question of the desirability of continuing to maintain these paths is seriously affected at this time by the extensive lumbering operations which, despite all efforts to prevent, began this fall and are now making rapid headway. While it will probably not be possible to save much from the present plan of operations for this winter, if the lumbermen shall not go beyond present indications no very serious damage will have been done on Mt. Adams. Mt. Bowman, however, will have been denuded entirely, and the appearance of Mt. Jefferson sadly injured.

PATHS ON THE RANDOLPH MOUNTAINS.

The Pond of Safety Path was cleared of windfalls and bushed out by T. S. Lowe and an assistant. The Ice Gulch Path was cleared by Mr. L. M. Watson, proprietor of the Ravine House, early in the season, and inspected in August by Mr. Louis F.

¹ See page 173.

Cutter, who, except for further minor repairs which he made at that time, found it in good condition. He believes that some brush scythe work will be needed next year in the open places.

PATHS ON THE CARTER-MORIAH RANGE.

The clearing of the Jackson-Carter Notch Path was placed early in the season in the hands of Jonathan G. Davis, of Jackson, but unfortunately through a misunderstanding no work was done. From logging the preceding winter it was in very bad condition, and several parties had more or less difficulty in keeping to it. The same continuing this winter, to clear it will involve more than the ordinary expenditure. The path is so important a one, however, that it should certainly be reopened, and signs placed at critical points.

The Glen-Carter Notch Path was cleared as usual by T. S. and V. D. Lowe, such of the old bridges as had become unsafe removed, and stepping-stone crossings provided. A few further signs are still needed, and are in the hands of the Lowes to put up at doubtful points as soon as the spring opens.

The new Wildcat Path was also cleared by them, and a stub path cut a short distance to an outlook, where a skeleton tower was set up commanding a fine view of all of the Presidential Range from Washington north.

The Carter-Moriah Path was cleared by T. S. and V. D. Lowe and an assistant. These Carter paths grow up very quickly, and the amount generally available for their annual maintenance has been scarcely enough to keep them passable. It would be well another year to do some more lasting work upon them, especially upon the Carter-Moriah Path, which needs to be widened in certain places.

The camp in Carter Notch was burned down about the middle of August. The cost of rebuilding a similar camp will be between \$25 and \$35, according to location, but in the opinion of the Councillor the camp should not only be relocated, but be a closed camp. The present location is generally condemned because it has proved such a smoky one, although it commands a fine view. Mr. Henderson Kellogg, who has camped every summer for ten years in the Notch, kindly offers his services in this matter, and his experience should be a valuable guide.

The argument for a closed camp, or one that by swinging doors can be closed, is twofold. First, unless the camp be a closed one, a few years will see every tree in sight of the pond cut for firewood, and the already impaired beauty of the place will be hereby well-nigh lost. Second, such is the topography that the wind blows from apparently every point of the compass in such rapid succession that it is practically impossible to keep an open camp in Carter Notch warm and at the same time free from smoke.

Imp Camp was temporarily repaired by the Lowes in a way sufficient, it was thought, to answer for this season, but next spring it will probably be found in very bad condition. The location of this camp also has never been satisfactory because of its relation to the prevailing winds, and it is thought that another location near by can be found in which the camp will be less smoky. As it will probably cost at least ten dollars to repair the old camp, against twenty-five dollars to build a new, the Councillor believes it would be well to rebuild next season in a better location.

PATHS AND CAMPS ON MT. WASHINGTON.

The Tuckerman's Ravine Path and the Boott Spur Trail were cleared and bushed out by the Lowes and left in good condition. The foot-bridge across Cutler's River at the foot of Crystal Cascade having been destroyed, a temporary bridge was built in its place, but should be replaced another season by a structure similar to the old one, which did excellent service for many years. This was a narrow foot-bridge three to four feet wide, with a guard rail on either side, and was swung high enough to escape the spring floods. To rebuild will cost about ten dollars.

The Raymond Path is reported as considerably in need of repair, and although this is not an A. M. C. path, the Club may appropriately take the initiative and in coöperation with Mrs. Raymond, who, it is understood, is desirous that the path should be put in good order, see to its being cleared in the spring.

The Hermit Lake Camp was renovated in the spring by the Lowes, and is reported in good repair. Here, as about the old Carter Notch Camp (to be referred to below), the demand for

fuel has already wrought sad havoc in the immediate surroundings, and as a help to reducing this consumption, it will probably be well to make this camp a closed one, or one which can readily be closed by folding doors.

The care of the Refuge Hut on Mt. Washington, although never formally transferred to him, has, by reason of its importance, been assumed this year by the Councillor, and under his direction it was inspected and cleared up, and the blankets were aired. Another year the door should be protected by a weather-board. Two men, who stopped at the Summit House this season, reported that their lives had been saved by this Hut.

PATHS IN THE SACO VALLEY.

The path up North Moat was cleared by the Councillor in June. The old extension of this path from the summit of North Moat, along the range to the summit of South Moat, has been reopened this season by G. C. Lucy of North Conway, under the direction of Miss Harriet E. Freeman, who has generously defrayed the expense. The path up South Moat from the Swift River Intervale is kept open by berry pickers, and while this long-established practice persists, will need no outside attention. By the Club's assuming the maintenance of this old path along the range, therefore, in addition to the present path up from Diana's Baths, there will be kept open the walk over the Moats from end to end, which will constitute an important and especially interesting link in walking tours from the Tamworth-Sandwich region northward and vice versa.

The Mt. Carrigain Path, not having been cleared for two years, was in especially bad shape. It was cleared this year under direction of Mr. L. D. Goulding, General Manager of Livermore Mills, and signs supplied by the Councillor were later put up by Dr. R. C. Larrabee. It was used a good deal this season, and was reported in good condition.

The Mt. Willey Path, Messrs. Barron and Merrill of the Crawford House were asked to have cleared as heretofore, but as far as known to the Councillor, nothing was done. It is reported still in fair condition, but as needing on its upper half some respotting and a few signs, being somewhat blind in several places. This path will, of course, always be a steep and rough one.

PATHS IN THE FRANCONIA REGION.

The path from the Little River lumber railroad to the summit of North Twin, and on to the summit of South Twin, and the trail thence over Guyot and Bond and down to the East Branch was made clear by the Councillor, except that for a short distance from the railroad one or two further signs next year will help to make the path more easily followed. The hanging bridges on the railroad should be avoided, as in many cases they are now quite unsafe.

In his trip over the Range, the Councillor was assisted by Mr. Rest F. Curtis, Dr. Frederick Tuckerman and Mr. Alfred B. Hubbard, as well as by Edward N. Haynes of Twin Mountain, who is an excellent man for this trip.

The Mt. Liberty Path was to have been cleared under the direction of Mr. Frank O. Carpenter, but owing to the constant rains this did not get done. This path will therefore need to be cleared another year, and probably several more signs put up at doubtful places.

The department has received several requests to construct a spotted trail up Mt. Garfield, the one made some years ago by the Club, and long since abandoned, being now buried in slash. It is reported that the lumbering operations there will be completed this winter, and therefore the cost of maintaining such a trail when once built would be comparatively small, and it seems to the Councillor that if a satisfactory arrangement can be made with those locally most interested, as he has reason to believe it can, the Club may well open and perhaps maintain such a trail. Its location, however, should be decided on only after careful consideration. One route urged starts about half a mile from Profile Golf House, and taking an easterly direction comes out on the east side of the "Papoose," then follows the ridge to the summit, the distance being estimated at seven miles. Another route, estimated to be about eight miles long, starts from the railroad two miles east of Bethlehem Junction, or the highway near this point, follows a good logging road two to two and a half miles, then slash-covered logging roads two to two and a half miles, then the old path three-quarters to one mile to the summit. While the second route outlined, follow-

ing more nearly the old Club ascent, would seem likely to be more generally useful, it is probable that the Club would receive more local assistance in constructing a path over the first. The Councillor's idea would be to do little more than spot a trail, it being expected that in a short time this would be so much used as to become a good path, of which the cost of the subsequent annual maintenance might not exceed five dollars.

Here it may be said that the extension of the Club's Mt. Liberty Path, which virtually extends to the summit of Lafayette, although it is not a Club path beyond the summit of Little Haystack, could at slight expense be extended along the range to the summit of Mt. Garfield. The way thither is not arduous, does not exceed four miles, and may at present be easily kept by following the line of surveyor's spots and cuttings. With some path up Garfield such as mentioned, this continuation would be of special value, and would have Haystack Pond (about three fourths of a mile below Garfield summit) as an interesting feature. The still further extension of this line, that has been suggested, to some point on the Twin Range will, if ever made, be very much more costly, and the route at best much more arduous.

The old path to Mt. Lafayette, of the reopening of which an account by Mr. F. O. Carpenter was included in the last annual report of this department, has been somewhat logged over since that time, and if adopted as a Club path should receive attention another season. Mr. Carpenter reports that one day's work of one man will probably be sufficient to clear it. It is probable, also, that a few new signs will be well.

PATHS IN WATERVILLE.

Under the direction of Mrs. S. B. Elliott, the Black Mountain Path was cleared early in the season, and the American Institute of Instruction Path¹ cleared to the height of land

¹ There were two American Institute of Instruction paths, this, which formerly connected Waterville with Livermore, and another, which ascended Carrigain from Livermore. All that remains of the latter is the approach to that mountain and the summit part, and it is commonly known now as the Carrigain Path. The former, however, called sometimes the Livermore Trail, no longer goes more than about halfway to Livermore, and seems to be most appropriately known by its old name, the American Institute of Instruction Path, or, as it is generally called, the American Institute Path.

where just before the path starts down toward the Swift River a short stretch of blow-down still impedes progress. Despite the lumbering that has been done in the valley, the Councillor followed this path in September with little trouble.

The Councillor, after conferring with President H. S. Stearns and ex-President A. L. Goodrich, of the Waterville Athletic Association, is of opinion that the liability of this path's being further logged over in the next few years is so slight as to justify the small expenditure which will be required to thoroughly clear it another year from Waterville to Camp No. 6 on the Swift River. Taken in connection with the new Swift River Trail, it forms the most direct route from Waterville to Albany, not crossing the Tripyramids, and its descent on the north commands one of the finest views in the mountains.

The attention of the Waterville Athletic Association has been called by the Councillor to the desirability of reopening the old path from Greeley Ponds to the Henry railroad, a distance of about two miles, and this will undoubtedly be done by them next season. This connection will be an especially valuable feeder to the Club's proposed system of trunk lines.

PATHS ON THE SANDWICH RANGE.

The Passaconaway Loop and the Passaconaway Lodge were as usual placed in the charge of the Wonalancet Outdoor Club, to make, in our behalf, such repairs as might be needed. No work was done, and though not in bad condition both will probably need some attention another year.

THE MADISON SPRING HUT.

Early in the season it was reported that the upper part of the west end wall of the Madison Spring Hut had fallen, and the Councillor of Improvements was made Chairman of a special committee of three upon its repair, the other members of the committee, Mr. J. Rayner Edmands and Mr. Allen Chamberlain, representing the Trustees of Real Estate. This committee visited the Hut the third week in June with the necessary workmen and materials, and a detailed account of their findings and accomplishments has been filed with the Trustees. The Hut was placed in thorough repair, the west end wall being rebuilt,

and all the walls and the chimney thoroughly repointed, the floor regraded, most of the bunks freshly boughed, and various important improvements made upon the Club's property surrounding the Hut, looking to a more wholesome condition and a less disfigured appearance of the immediate natural landscape. Various minor articles have been furnished to replace others outworn. A new record-book has replaced the old one filled, and two such new books have been placed at the Ravine House, whence they can be readily supplied to the Hut at short notice when required. As soon as weather conditions shall permit in the spring, a new stove-pipe is to be placed in the Hut and new lanterns of a more durable sort. The general surveillance of the Club's property here at Madison Spring has been given this year by T. S. Lowe.

No case of the exclusion of any one from the needed shelter of the Hut has been reported to the Councillor, but there have been further cases of overcrowding, and under existing conditions he sees for this evil no complete remedy consistent with the Club's spirit of hospitality. The admirable rules drawn up and published by his predecessor, Mr. Parker B. Field, have been posted in all the principal hotels in the region, and the Councillor believes that their tactful enforcement by Club parties and others occupying the Hut will in the long run secure, as well as anything for the present can, the conditions so greatly to be desired.

RECORD CYLINDERS AND ROLLS.

No new cylinders have been established, but arrangements have been made for replacing the one on Jefferson by a new one, the old one having been reported leaky by Mr. R. A. Bullock. It is not known at this writing whether the new cylinder has as yet been substituted in its place. The usual number of filled rolls have been forwarded to the Department and new rolls sent to replace them. Supplies of these rolls for meeting future needs more promptly have also been deposited at the Ravine House, Randolph; Livermore Mills, Livermore; Wonalcet Farm, Tamworth; Elliott's, Waterville; and at Passaconaway, Albany. The cost of maintaining this long-established practice of the Club is comparatively small, and the records are

often of interest and sometimes of considerable importance, more particularly in places of danger, as upon the Presidential range.

THE MADISON BOULDER.

Among the special matters which have been brought to the attention of the Department in the past year has been that of the preservation of the well-known gigantic boulder at Madison, N. H. It has seemed to many that the Club's good offices were now really needed to preserve this great monument of the ice age, believed to be the largest boulder in this country east of the Rockies, and the Councillor, having first collected what information he could upon the subject, has referred the matter to the Trustees of Real Estate.

WORK DONE BY OTHERS.

Among the new paths and trails opened this year by others than the Club, as such, may be mentioned the following:—

The Hawks Trail, a delightful trail upon the Hawks, spotted by Mr. E. B. Cook and others. Though long, it is said to be a very pleasant alternative way of gaining the summit of Mt. Madison.

The Spur Trail, round the head of King's Ravine, described as one of the most beautiful in that region.

The Pebomauk Fall Path, cut by Mr. L. M. Watson of the Ravine House, Randolph (by funds contributed by a last summer's visitor), from foot of the Ice Gulch to Pebomauk Fall. It is reported by Mr. Louis F. Cutter to be a smooth and easy path, partially graded, and keeping so near the brook as to be very lovely and interesting.

Moosilauke. A new trail up this mountain is reported by Mr. L. L. Whitney of Lincoln, Mass., as having been blazed this summer. It starts in at Glen Cliff (Warren Summit), is five miles long, and by it the ascent can be made easily in two and one half to three hours. It is also reported that the Little Path up this mountain, which was badly obstructed by windfalls on its upper part, has been cut out and put in first-class order. The Beaver Brook Path is further reported in good order.

The Wonalancet Outdoor Club has this season cut several new short paths, including one from Locke Falls cottage to

James Liberty's house, making an interesting short cut from Wonalancet to the summit of Chocorua. The Champney Falls Path up Chocorua has been improved, and the Square Ledge Trail from Shackford's has been made much easier by the removal of many old blown-downs, so that this way through from Tamworth to Albany is now in as good condition as the Lost (or Bolles) Trail. The work in both cases has been done by Onslow S. Smith of Passaconaway, partly at his own expense and partly by funds contributed by a summer visitor.

Other new paths and camps have doubtless been built of which no word has come to this Department.

THE DEPARTMENT AS A BUREAU OF INFORMATION.

The Councillor would call attention to the exceeding desirability of his being kept informed by members of the Club and others of all work done of which they learn, which has to do with the making or repairing of paths and camps anywhere in the White Mountain region, or with similar improvements of interest to this Department, and of the condition of the record cylinders and the rolls they contain. The Department's correspondence this year with Club members and others has been extensive, but nowhere near what it should be for the thorough effectiveness of the Department's work.

A card catalogue record has been begun of all paths, camps, etc., in the White Mountains, whether or not within the range of the Club's responsibility, in which is put down in brief form the statement of all work done as soon as it is reported, and likewise the condition, good or bad, of any path or camp, or its special needs for repairs, with estimated cost, best man to do the work, etc., etc. It is hoped that this will be of service to future Councillors, not only in their work upon the maintenance or extension of the paths and camps in their charge, but also in enabling them more readily and efficiently to meet the demands upon the Department as the natural bureau of information to which Club members in particular, but also the interested public in general, are accustomed to appeal. Of course, however full and accurate its information, the Department must let it be distinctly understood that it recognizes no responsibility whatsoever beyond the scheduled paths and camps. But in

order that, even upon these, its information should be as complete and as up to date as possible, after every trip over a Club path or night spent in a Club camp, a report should be sent by some member of the party to the Councillor (even if only a few words on a postal card). Such a report, whenever calling attention to a bad condition or a special need for repair, should best be as specific as it is possible to make it, as to a considerable extent the work of repair is necessarily directed only by correspondence. It seems only reasonable that in such a time-consuming, unremunerative office there should always be this much coöperation upon the part of other members of the Club, and it is believed that much assistance will always be contributed by outsiders interested.

In conclusion, the Councillor wishes to offer his most grateful acknowledgments for the constant help he has received from his predecessors, Messrs. Field and Cutter, and especially from the former's schedule of paths and camps and the latter's blueprint map ; to members who have assisted him with information and in other ways, including besides his fellow officers, Mr. Rest F. Curtis, Mr. J. Rayner Edmands, Miss Harriet E. Freeman, Mr. A. L. Goodrich, Dr. R. C. Larrabee, Mr. Frank O. Carpenter, Mr. Henderson Kellogg, Mr. T. E. Parker, Mr. Alfred B. Hubbard, Mr. Fred B. Maynard, and many others ; to non-members, including President A. H. Hall and Secretary Mrs. Arthur T. Walden of the Wonalancet Outdoor Club, and President Henry S. Stearns, of the Waterville Athletic Association, for cordial coöperation ; to Dr. Frederick Tuckerman of Amherst, for information and advice, and for assistance on the Twin Mountain Path ; and to Mr. L. D. Goulding, General Manager of the Livermore Mills, Mrs. S. B. Elliott, of Waterville, Mr. L. M. Watson, of the Ravine House, Randolph, Mr. W. L. Barron, of the Twin Mountain House, and Mr. James M. Shackford, of Passaconaway, for their continued favors to the Councillor in his official capacity.

Report of the Excursion Committee for 1902.

THE Winter Excursion—February 15 to March 3—was planned and conducted as usual by the officers of the Snowshoe Section, Messrs. W. R. Davis and Rosewell B. Lawrence. The Iron Mountain House in JACKSON was again the headquarters of the party, which numbered 111. Excursions were made to the summit of Thorn, to the Wigglesworth Ledges, a number of times to the Morrison Cottage, and twice to the summit of Black. A large company visited the lumber camps in Perkins Notch, and a smaller one went into Carter Notch. An over-night party slept in Bald Mountain camp, its members making the ascent of North Baldface. One day was devoted to Iron Mountain, the return being made by a direct line over the various summits of the range. Twenty-one climbed to the summit of Spruce Mountain, and 43 visited Tuckerman's Ravine. Ten went into Huntington's Ravine, two mounting the head wall. Fifty-four climbed Clinton, and two parties on different days walked up Willard. The summit of Mt. Washington was gained by a number of small parties, aggregating 9; four ascended the carriage road, three climbed up through Tuckerman's Ravine, going down to Fabyan, while two left the Ravine House and, making the summits of the northern part of the range, also descended to Fabyan.

The Decoration Day Excursion to DUBLIN, N. H., and Monadnock, Thursday, May 29, to Monday, June 2, inclusive, was conducted by Messrs. Charles E. Lord and C. A. Newhall. The party, numbering 33 persons, left Boston at 3 P. M., arriving at the Leffingwell in Dublin at 6.45 P. M. Friday, a small party drove to Pack Monadnock, while the larger number walked around Dublin Lake in the morning, and in the afternoon groups were made up for drives to Jaffrey and Peterboro. On Saturday, nearly the entire company climbed Monadnock, and were rewarded with very extended and beautiful views in all directions, Mt. Washington being visible without the aid of a glass. The next day about 15 drove to Pack Monadnock, but did not obtain as fine views as on the preceding day. On Monday, small parties enjoyed driving to the various towns about Dublin, and at two P. M. left for the return trip to Boston.

The attendance at the LAKE GEORGE Field Meeting was in all 79. The party left Boston on Friday, June 27, for Saratoga, stopping over night at the United States Hotel. On Saturday morning, 65 took a drive about Saratoga, and in the afternoon went by train and steamer to The Sagamore, on Lake George. On Monday, some 36 made the ascent of Buck Mountain, taking steamer to Point Comfort, from which an excellent path ascends over ledges and ridges with almost constant outlooks. The path is steep and direct. The day was cool and the views extended. For Tuesday, no all-day trip was planned. Some went in the forenoon by road up the hills back of Bolton, — a portion of this party made the ascent of the Pinnacle; in the afternoon a second party went from the hotel direct to the Pinnacle. The two groups numbered together about 30. On Tuesday evening the members,

reinforced by other guests of the hotel, assembled in the music hall to listen to Professor A. B. Woodworth, who spoke on the glacial story of the region (see p. 231). The all-day excursion for Wednesday was to Cat Mountain, a fine peak to the west of Bolton. The point of leaving the road was Edgcombe Pond, and, after crossing a swamp, a ridge was found which led direct to the summit, the company taking from choice the cliffs and ledges forming the face of the mountain. The view from the summit well repays the climb, giving as it does the extent of the Adirondacks and the beautiful country about Schroon River and Pond. Fifteen persons made this ascent. Thursday morning being rainy, the proposed steam-launch trip about the islands was given up, but in the afternoon there were numerous boating parties. Friday was devoted to Black Mountain. Landing at Black Mountain Point and passing the ruins of the old hotel, a path was followed along a brook for perhaps a quarter of a mile to ledges from which the path, still very moist, leads off. Within a few minutes it is defined by an excellent bridge which crosses the main brook, and from this point to the summit it is unmistakable. Above the zigzags and near the top there are many branches, all leading to the summit. Twenty-seven ascended Black Mountain and enjoyed its wonderfully fine view. On Saturday most of the party went by steamer to the northern end of the lake, returning in the afternoon.

The return to Boston was made on Monday, July 8. The committee was Messrs. George W. Taylor, chairman, John Ritchie, Jr., and J. Allen Crosby.

The place selected for the regular camp of the Club, August 8 till 22, was the Salmacis site in RANDOLPH, N. H., which was occupied in 1897. Mr. Watson, who owns the land, has built a permanent house which contains the kitchen and one or two rooms that may be used at need, while other improvements about the "campus" made the location of the camp ideal. The felling of some dead trees afforded material not only for the fire itself, but for rustic seats about it in an open amphitheatre, so that the gatherings in the evening were more than ever a feature of camp life. The plan of the camp was essentially that of 1897, tents arranged in two arcs about the fireplace, the marquee on the level below, and some scattered tents in the adjacent woods.

The party numbered 23, most of whom arrived by train on Friday evening, August 8. Saturday was devoted to getting settled in the tents, and on Sunday some minor walks were taken. Monday proved to be rainy, so that the regular programme was not established till Tuesday. Three parties spent that night in higher camps, — six and a guide at the Madison Hut, seven and a guide at the Perch, and six at the Log Cabin. All of these parties remained on the range through Wednesday. The four from the camp joining them, every member was on some one of the summits during the day. On Wednesday evening all were gathered at the camp fire. On Thursday the walk was to Coösauk Falls, 13 participating, while a quick party of three, leaving the camp early in the morning, dined at the summit of Mt. Washington, returning to the camp to supper. The afternoon of Thursday

was devoted to a round of social functions, Mrs. Stearns receiving at her cottage and Mrs. and Miss Johnson at their camp.

For Friday the trip was to the Ice Gulch, and on this walk five members of the Club, not campers, joined, making 22, the total at lunch at the spring. On Saturday 18 went up through King's Ravine, of whom six went on to spend the night on Washington, three returned by the new Spurr trail, and six by the Valley Way. Four went up Madison by the newly spotted Howker's Trail, returning with the party down the Valley Way. Monday night two parties were afield, — six at the Hut, eight at the Perch, while four made the ascent of Madison by "the Howks," two of whom returned to camp to supper.

On Tuesday, August 19, everybody was again on the range. Five left camp for the summit of Madison by "the Howks," intending to spend the night at the Hut; two of the Hut party went to Washington, returning to camp by railroad; two from the Perch went to Washington, returning by the carriage road; two from the Hut made the summit of Adams and returned to camp by the Spur Trail; four went from the Perch to the summit of Washington and returned to camp by the Randolph Path; two from the Perch went to the summit of Adams and returned to camp by the Air Line; two from the Hut came down the same way, while a light party consisting of the committee and one guard left the camp in the morning, breakfasted at the Perch, went on to the summit of Adams, called at the Hut, noted the members of the party at each place, and returned to the camp for supper by the Air Line.

On Wednesday a party of six went to Pine Hill, but Thursday was rainy.

On Friday the party broke camp, 12 going direct to Three Mile Island, to remain there till Monday.

The campers have to thank Mr. J. Rayner Edmonds for the use of his camps during their stay, and Mrs. C. C. Stearns for the courtesy of the log cabin. The committee for the excursion was Mr. John Ritchie, Jr.

The Labor Day Excursion was to the ISLES OF SHOALS, the party, which numbered twenty-five, leaving Boston on August 30 and returning September 2. Saturday afternoon, after arrival, was devoted to a walk about Appledore Island and a scramble over the rocks, and the next day a number of the other islands in the group were visited. Monday was the occasion of a deep-sea fishing trip, and in the afternoon the party sailed about among the islands. The committee in charge of the excursion was Mr. G. D. Newcomb.

The WALKING PARTY was comfortably small this year, numbering nine in all. It assembled at the Mountain Park Hotel, North Woodstock, on Tuesday evening, September 3. The next day was devoted to a long trip, first over Mount Cilley to the road, and thence by the Little Path to the summit of Moosilauke. The distance is scheduled at twelve miles, but it means certainly seven hours of exertion with an energy that would accomplish three miles an hour on the road; it was past six o'clock when the last of the party

was housed. The night was very rainy, and the storm continued till after eight o'clock in the morning, so that in making the descent all were thoroughly wet by the bushes. The Mountain Park Hotel was reached in time for supper. Friday was devoted to the walk to Waterville, — across the fields and then by the regular path, which has been cleared and straightened at the Waterville end since last year. The fourth day was by the new Cascade Path to the summit of Whiteface and thence to Wonalcet Farm, where Sunday was spent. On Monday over wood-paths and "the Brook Path" Chocorua was ascended, and in the afternoon the descent was made to Shackford's. Tuesday's walk began with the fording of the Swift River; thence, as last year, through Bear River Notch to the Cave Mountain House, Bartlett, arriving in time for dinner. In the afternoon the party walked up Langdon. Starting down through the pathless woods on the north side the Jericho Valley was reached. The intention had been to pass by some short cuts to Jackson, but a rainstorm set in and it was deemed better to keep to the road, so that some three miles was added to the record for the day, seven of which were through a drenching rain. Wednesday's walk was from Gray's Inn to Carter Notch. The camp in the Notch having recently been burned, it was necessary to camp in a shelter of canvas, and this in a wind that threatened at times to blow the whole outfit into the lake. After supper, when it was practicable to build a larger fire, the cold and wind were forgotten, and a very comfortable night was spent. Thursday morning most of the party ascended Carter Dome, returning late in the forenoon, when a start was made for the Ravine House by way of the Nineteen Mile Brook path. On Friday the party walked by the Valley Way over the various summits of the Presidential range, reaching Mt. Washington in mid-afternoon. The next morning proved to be rainy, so that the descent was made by train, the walk down over the Mt. Pleasant path being the only part of the proposed programme that was omitted.

Five remained at Rosebrook Inn over Sunday, to take a three days camping trip through the Wilderness of the Twins, starting on Monday with Vyrion and Thaddeus Low for guides. The path up the North Twin was not difficult, the trail having been made clearer by the Department of Improvements a few days before, in whose camp, high on the side of the mountain, the night was spent. Quite early on Tuesday the party had gained the summit of the North Twin and had begun the walk along that famous ridge in which the South Twin, Guyot and Bond are the prominent knobs, all of them of about 5000 feet altitude. The walk was a long one, lasting into dusk; at about half past six in the evening camp was made at an old site in the bed of Bear Brook. The morning's walk on Wednesday was through the splendid forest that borders the East Branch, which in a year or two will be laid low, for the last part of the way was over the surveys for an extension of the lumber railroad. The night was spent at the Mountain Park House in North Woodstock, and on Thursday the party returned to Boston.

One of the largest and most successful of the excursions of the Club was

that to the CRAWFORD HOUSE, September 20 to 23, 153 persons assisting. The party left Boston by special train, reaching Crawford's early in the afternoon. Informal walks were taken on Sunday to the site of the Willey House (64 persons) and at sunset time to Mt. Willard (48). On Monday there were two parties, one for Avalon (75) and thence to Field and return (12). On Tuesday the objective point was the summit of Mt. Washington. There were four sections, each taking a different route, viz., by railway up and down (37), by the Crawford Path both ways (10), up by the path and back by train (6), and up by train and back by the path (40). The day was exceedingly fine.

On Wednesday 29 climbed to the summit of Webster. On Thursday the party set out for Livermore Mills, a portion (30) being entertained by the Lumber Company, while 50 ascended Carrigain. Friday was rainy, so that the proposed climb of Mt. Willey was given up. The return to Boston was made on Saturday. Messrs. G. D. Newcomb, A. D. Wilde, G. W. Taylor and J. A. Crosby were the committee.

A sub-committee (Messrs. Ritchie, Newcomb, and Wilde) arranged for the all-day and Saturday outings, 51 in all. Of these, 44 were taken by 1688 members and friends, an average of about 38. Seven were postponed because of rain.

Nine of these outings were planned for all-day trips, in many cases the afternoon party joining the main one, and returning with it. The average attendance was 64.

The following is a list of the Outings, the leaders, and the number participating :—

Date.	Place.	Leader.	Attendance.
Jan.	4. Clarendon Hills and across country to Highland Station, 3 miles.	Mr. Newcomb.	12
	11. Islington, Fisher's Pond, 3½ miles.	Mr. Moffette.	26
	14. Chestnut Hill, Hammond's Pond and Woods to Newton Centre, 3 miles.	Mr. Newcomb.	17
	18. Milton, Nahanton, Kitchamakin, and Chickatawbut, 3 miles.	Mr. Field.	39
	25. Waltham, Jericho Hill, 4 miles.	Mr. Chamberlain.	17
Feb.	1. Highland Station, around Robin Hood's barn, 4½ miles.	Mr. Carpenter.	7
	8. Middlesex Fells from Oak Grove, 3 miles.	Mr. Bailey.	18
	15. Highland Station, Bellevue and Muddy Pond Woods, 3 miles.	Mr. Crosby.	34
	22. Milton, Fairmount, 3½ miles.	Mr. Field.	13
Mar.	1. West Quincy, Rattlesnake, 3 miles.	Mr. Ritchie.	14
	8. Lynn. Lynn Beach, Little Nahant, 3 miles.	Mr. Newcomb.	17
	15. Winchester Highlands, Bear Hill, and Fells, 4 miles.	Mr. F. W. Stone.	40

Mar. 22.	Lynn. Lantern Rock, Barrill Hill, 3 miles.	Mr. Bailey.	34
April 5.	Lynn. Floating Bridge, Spring Pond and Prospect, 3 miles.	Mr. Newcomb.	42
12.	Dedham. High Rock, Evergreen Hill, 3 miles.	Mr. Moffette.	52
19 (<i>all day</i>).	Gloucester. Shore walk, Rocky Neck to Bass Rocks, 5 miles.	Mr. Newcomb. Mr. Crosby. Mr. Wilde.	207
May 3 (<i>all day</i>).	West Quincy. Over all the summits to Big Blue, 9 miles.	Mr. Ritchie.	14
10.	Wakefield. Castle Hill, Happy Hollow, Hart's Hill, 3 miles.	Mr. H. A. Perkins.	43
17.	Roberts. Norumbega and New Charles River Reservation, 3 miles.	Mr. Bailey.	53
24.	Nantasket Junction. Brewer's Lane, Planter's Hill, and World's End, 3 miles.	Miss Andrews.	39
30 (<i>all day</i>).	Lowell. Carlisle Pines, 5 miles.	Mr. Rogers.	55
31.	Riverside. Seavern's Brook, Rev. John Davenport's Stone, 3½ miles.	Mr. Chamberlain.	36
June 7 (<i>all day</i>).	Canobie Lake. Dinsmore's Hill, Cobbett's Pond and Mr. Brooks's Camp, 6 miles.	Mr. Brooks.	15
	(<i>afternoon</i>). Highland. Bellevue and Muddy Pond, 3 miles.	Mr. Crosby.	13
14 (<i>all day</i>).	Newton Junction, N. H. County Pond, Red Oak Hill and Bonniestrath Hill, 5 miles.	Mrs. Little.	14
	(<i>afternoon</i>). Bellevue and Muddy Pond Woods, 3 miles.	Mr. Crosby.	19
17 (<i>all day</i>).	Newburyport. Plum Island, Beach and Dunes, 5 miles.	Mr. Newcomb. Mr. Crosby. Mr. Wilde.	111
Sept. 20.	Lynn. Sanborn's Ledge and Holy Cross Hill, 3 miles.	Mr. Bailey.	11
Oct. 4 (<i>all day</i>).	To Great Blue.	Mr. Ritchie.	62
	(<i>afternoon</i>). " "	Mr. Crosby.	
11 (<i>all day</i>).	Lowell. Carlisle Pines, 5 miles.	Mr. Rogers. Mr. Crosby.	53
	(<i>afternoon</i>). 2 miles.		
18.	Dedham. Twin Pine Hill and Satan's Kingdom, 2 miles.	Mr. Moffette.	32
25.	Milton. Neponset River Bank and Milton Hill, 3 miles.	Miss Lanning.	56

Nov.	1.	Milton. Wampatuck, 4 miles.	Mr. Ritchie.	47
	4	(all day). Baker Bridge, Haunts of Thoreau, Fairhaven Hill and Robinson Camp, 5 miles.	Mrs. Tarlton.	49
	8.	Wedgemere. Shaker Glen, 6 miles.	Mr. Homer.	52
	15	(moonlight). Dover. Pegan Hill. Bailey's Hotel for supper, 3 miles.	Mr. Newcomb.	55
	22.	Wakefield Junction. Crystal Lake, Happy Hollow, Hart's Hill, 3 miles.	Mr. H. A. Perkins.	74
	29.	Chestnut Hill. Brookline Woodlands, Sprague Estate, Green Hill and Arboretum, 4 miles.	Mr. A. H. French.	84
Dec.	6.	Lynn. Swampscott, Shore Walk, 3 miles.	Miss Saunderson.	34
	13.	Dedham. Fox Hill, Sandy Valley, 5 miles.	Mr. Moffette.	9
	20.	Auburndale. Kame and Charles River, 3½ miles.	Mr. Chamberlain.	39
	27.	Wakefield Junction. Hart's Hill and Rattlesnake Hill, Happy Hollow, 3 miles.	Mr. H. A. Perkins.	30
44 outings with a total of				1688

A summary of the eight excursions made during the season follows : —

Feb. 15—Mar. 3.	Jackson, N. H. (Snowshoe).	{ Mr. Davis. Mr. Lawrence.	111
May 29—June 2.	Dublin, N. H.	{ Mr. Lord. Mr. Newhall.	33
June 27—July 7.	Lake George, N. Y.	Mr. Taylor.	79
Aug. 9—23.	Salmacis Camp, Randolph, N. H.	Mr. Ritchie.	23
July 19—Sept. 2.	Camp at Three Mile Island.	Mr. Lawrence.	94
Aug. 29—Sept. 2.	Isles of Shoals.	Mr. Newcomb.	25
Sept. 3—13.	Walking Trip, White Mountains.	Mr. Ritchie.	9
Sept. 20—27.	Crawford House, N. H.	{ Mr. Newcomb. Mr. Taylor. Mr. Crosby. Mr. Wilde.	153
			<hr/> 527

JOHN RITCHIE, JR.,
CHARLES E. LORD,
GEORGE W. TAYLOR,
EDWIN A. START,
GEORGE D. NEWCOMB,
C. A. NEWHALL,
A. D. WILDE,

Committee on Field
Meetings
and Excursions.

Proceedings of the Club.

May 14, 1902. — Two Hundred and Nineteenth Corporate Meeting.

President Howe in the chair.

About two hundred and fifty persons were present.

Professor W. H. Niles occupied a short time in speaking of the geological aspects of the volcanic eruptions in the islands of Martinique and St. Vincent, illustrating his remarks with a sketch map of the region under discussion.

Mr. Elwood Mead, of Washington, D. C., expert in charge of investigation in irrigation for the United States Department of Agriculture, then read a very interesting paper on "The Land and Water Problems of the Arid Region." The reading of the paper was introduced by showing upon the screen a large number of views illustrating the history and development of irrigation in the Western States; the use of the land for cattle ranges; constructions for controlling and diverting the flow of water upon the land, and the apparatus used for measuring the water. Irrigation antedates the settlement of Jamestown by more than sixty years, being employed by the old Spanish missions which, by means of reservoirs and ditches, established a line of oases through Mexico and California. Modern work has been done with the highest engineering skill. The speaker also described the legal controversies of the irrigators.

May 21, 1902. — Special Meeting.

Ex-President Alexis H. French in the chair.

About two hundred and fifty persons were present.

Mr. Edwin S. Balch, of Philadelphia, spoke on "Antarctic Exploration," reviewing the progress of exploration in the antarctic continent and waters, especially to show the work done by Americans, chiefly officers of the United States Navy, and in order to furnish the basis for a juster estimate than British assumptions usually allow. Maps were thrown on the screen by way of illustration.

Mr. Charles H. Ames gave an account of an ascent of Mt. Hood with the Mazamas during the preceding summer, liberally illustrating his narrative with views of the party, of Mt. Hood, and of the wonderful Oregon forests, some of the slides for the last-mentioned pictures being furnished by the Bureau of Forestry at Washington.

June 11, 1902. — Two Hundred and Twentieth Corporate Meeting; held in Huntington Hall.

President Howe in the Chair.

Some four hundred persons were present.

Introducing the speaker of the evening, Mr. Herbert W. Gleason, whose subject was "A Photographer in the Canadian Rockies," the President referred to the progress that had been made in knowledge of the Canadian

Rockies and the Selkirk since they were first exploited, and to the active and creditable part taken by members of the Appalachian Mountain Club.

Mr. Gleason disclaimed the title of photographer, except as an enthusiastic amateur. He presented a noteworthy series of lantern slides, from photographs taken from the point of view of the artist, rather than of the topographer and the conqueror of mountains. The views covered a wide range of scenery in the Rockies and Selkirks. They were accompanied by an interesting, informal talk.

June 27-July 7, 1902. — Thirty-seventh Field Meeting ; held at The Sagamore, Lake George, N. Y.

On Tuesday evening, July 1, the members of the Club and the guests of the Sagamore to the number of nearly one hundred, assembled in the Casino of the hotel to listen to the literary portion of the Field Meeting. The speaker was Professor A. B. Woodworth of Harvard University, who is at work in the Lake George region in the interests of the New York Geological Survey, and his paper had to do with the local geology. He outlined first the general geological story of northern New York, coming later to the local story of the lake and the country immediately surrounding it. The curious nature of the outflow of the lake, which is north through Lake Champlain into the St. Lawrence, was one of the more interesting features of the paper. Professor Woodworth explained that the region is now undergoing a gradual tilting, which if continued for a short time, geologically speaking, would work curious changes in the outflow. It needs an elevation of a few feet merely to overtop one or another of the low barriers at the southern end of the lake, in which event the outflow would be to the south and into the Hudson. The paper was well illustrated by maps and sketches.

October 8, 1902. — Two hundred and twenty-first Corporate Meeting ; held in Huntington Hall.

President Howe in the chair.

About three hundred and fifty persons were present. The Recording Secretary read a communication from the Chairman of the Trustees of Real Estate announcing the gift to the Club from the widow of Ithiel E. Clay of ten acres of land on Baldface mountain and ten acres on Kearsarge mountain with rights of way to each ; also that the subscriptions for the Carlisle Pines came to a larger sum than was necessary for the purchase of the land, and that \$100 had been paid by the Massachusetts Forestry Association to the Trustees of the Club for the use of this reservation only.

The President announced the appointment of the following committee to nominate officers for 1903: Hon. Harvey N. Shepard, Chairman ; Miss Nina Carter, Miss Mary A. Furbish, Mr. Edward E. Norton and Mr. George M. Weed.

Professor C. E. Fay announced the decease of Jean Habel of Berlin, Germany, a corresponding member of our Club, a man prominent in geo-

graphical circles and widely known for his explorations in the Andes and Canadian Rockies.

President Howe spoke of the decease of Major J. W. Powell, an honorary member of our Club, a soldier in the Civil War, the organizer of the United States Geological Survey, and the explorer of the Grand Cañon of the Colorado.

Mr. Edward Little Rogers gave an interesting talk on "The Saturday Outings," illustrated by a hundred lantern views. He gave statistics of the outings, described the methods by which they are conducted, and emphasized their many attractive features. The pictures, taken by the speaker on the outings he has attended, showed scenery in the various sections of Metropolitan Boston, the Middlesex Fells, the Lynn Woods, the Blue Hills, the Waverley Oaks, etc.

November 12, 1902. — Two hundred and twenty-second Corporate Meeting.

President Howe in the chair.

About one hundred and seventy-five members and friends were present.

Rev. James Outram addressed the Club on his recent seven weeks' trip in the Canadian Rockies (see p. 142). The speaker began with a graceful acknowledgment of his election as a corresponding member of the Club, and then, assisted by more than eighty lantern slides, told in his happy way of the many pleasant features of the trip, and wished that before the cream was skimmed off, all of his fellow members could make a trip to this most delightful region.

Before concluding his remarks, Mr. Outram, through the kindness of Mr. H. G. Peabody, had some fifteen or more of the latter's finely colored slides of the region about Banff and the Bow River thrown upon the screen.

November 17, 1902. — Special Meeting.

President Howe in the chair.

An invitation had been extended to the members of the Twentieth Century Club to attend this meeting, the speaker having been prevented from giving his lecture before that Club in October. Over three hundred persons were present.

The Rev. Henry G. Spaulding gave his new illustrated lecture, "Vesuvius and Pelée." The eruption which destroyed Pompeii was of an explosive type, unaccompanied by any outflow of lava. To the same type belongs the recent eruption of Pelée. In each case torrents of volcanic mud caused great havoc. The destruction of the old Roman city was the slow process of a three days' burial beneath showers, first, of dry volcanic ashes, and, afterwards, of volcanic paste and mud. St. Pierre was cut off in a few minutes. Of the Pompeiians the great majority made their escape in safety. Of the thirty thousand shut up in St. Pierre only one individual survived. The blast of steam and hot volcanic sand came from the old crater on the

mountain's summit, and was the result of an initial downblast acting on the following upthrust and turning this heated mass of vapor in a lateral direction upon the ill-fated city. Interesting illustrations of both Vesuvius and Pelée were thrown upon the screen, together with scenes among the excavations of Pompeii and views showing the temples and homes of the ancient city.

December 10, 1902. — Two hundred and twenty-third Corporate Meeting.

President Howe in the chair.

About one hundred and twenty-five persons were present.

The President announced the appointment of the following Committees : To audit the accounts of the Treasurer and of the Trustees of Permanent and Reserve Funds, Mr. Charles L. Burrill, Chairman, Mr. Frederic W. Stone, and Mr. Albert E. Duffill ; on the Annual Reception, Mr. Rest F. Curtis, Chairman, Miss Mabel C. Chester, Miss Helen E. Endicott, Miss Gertrude Woodberry, Mr. William T. May, Mr. Edward Little Rogers, Mr. Samuel E. Tinkham.

The President introduced as the lecturer for the evening Mr. Charles A. Hathaway, who by request repeated his lecture of February last, "Fellowship with Flower Folk." The lecture was beautifully and profusely illustrated, forty new slides being used in addition to those shown on the former occasion.

December 18, 1902. — Special Meeting.

President Howe in the chair.

About two hundred and fifty persons were present.

Mr. George H. Worthley, a member of the Club, lectured on "Argentina: once a Colony of Spain, now a prosperous Republic," illustrating his subject with a large number of fine stereopticon views.

A sojourn of six years in Argentina and Uruguay had afforded the speaker ample opportunity to observe the material, political and social life of these two countries, and especially of the former. The political divisions, the cosmopolitan population, climate, soil, cattle-raising, the life of the plains, and life in the cities, Montevideo, Buenos Ayres, Cordova, Mendoza, were vividly set forth. The unfortunate financial condition of Argentina was ascribed to a period of over-speculation from 1880 to 1890. Many magnificent public buildings were erected at this time. The desirability of cultivating more extended commercial relations was dwelt upon, — only a small portion of Argentina's commerce being with the United States. The extreme courtesy and generosity of the people was highly praised.

The grandeur and beauty of the Andes of the western frontier was compared with that of the Alps, and some fine mountain views were shown, including one of Mt. Aconcagua.

The speaker related many interesting and thrilling experiences of his life on the plains and in connection with one of the revolutions.

January 14, 1903. — Two hundred and twenty-fourth Corporate (Annual) Meeting.

President Howe in the chair.

One hundred and ten persons were present, including seven ex-Presidents of the Club.

The reports of the different departments were presented : Natural History, by Harlan P. Kelsey ; Topography, by Frederic Endicott ; Art, by Mrs. L. B. Tarlton ; the report of the Councillor of Exploration and Forestry, Mr. Allen Chamberlain, was read by the Recording Secretary ; that of the Councillor of Improvements was deferred to a later meeting.

The reports of the Excursion Committee and the Room Committee were presented by Mr. J. Ritchie, Jr. Professor C. E. Fay, in lieu of a report of the Committee on the Sella Collection, announced that, by vote of the Council, the Committee had at its own request ceased to exist, and that the Collection would henceforth be in care of the Councillor of Art.

The annual reports of the Treasurer, Trustees of the Permanent and Reserve Funds, Auditors, Trustees of Real Estate, and of the Corresponding and Recording Secretaries were then presented. It was voted to accept the various reports presented by committees and officers.

Mr. H. N. Shepard, chairman of the Committee to nominate officers for 1903, reported as follows : —

For President, George H. Barton ; for Vice-President, Edmund A. Whitman ; for Recording Secretary, Rosewell B. Lawrence ; for Corresponding Secretary, John Ritchie, Jr. ; for Treasurer, Rufus A. Bullock ; for Councillors : Natural History, Harlan P. Kelsey ; Topography, Frederic V. Fuller ; Art, Mrs. Lewis B. Tarlton ; Exploration and Forestry, Allen Chamberlain ; Improvements, James Sturgis Pray ; for Trustees : Permanent and Reserve Funds (for three years), Isaac Y. Chubbuck ; Real Estate (for four years), Charles E. Fay.

The balloting resulted in the election of the candidates nominated. On retiring from the chair President Howe presented an address upon the welfare of the Club and particularly on its finances, and then introduced the new President, Professor George H. Barton, who accepted the office in fitting terms.

January 28, 1903. — Special Meeting.

President Barton in the chair.

About three hundred persons were present.

Ex-President Harvey N. Shepard described "A Summer in Scotland." The speaker led his audience through a large portion of that interesting country, alluding to many incidents famous in history and literature, and describing scenery both beautiful and grand. A large number of finely colored lantern views increased the interest of the lecture.

February 11, 1903. — Two hundred and twenty-fifth Corporate Meeting.

President Barton in the chair.

There were about one hundred and sixty persons present.

Miss Carrie M. Kingman presented an illustrated paper entitled, "A Trip to Brasil." The lantern was used and illustrations shown of St. Thomas, Barbadoes, Para, Bahia, and Rio de Janeiro. The lecturer gave her very interesting experience as a teacher in a private school for girls, and described among other things the climate and the coffee industry.

March 11, 1903. — Two hundred and twenty-sixth Corporate Meeting.

President Barton in the chair.

One hundred and thirty-five persons were present.

Mr. James Sturgis Pray presented his report as Councillor of Improvements for the year 1902 (see p. 211, also p. 173).

Then followed a discussion upon the hygiene of mountain climbing. A letter from Mr. W. G. Hubon, who suggested the subject but could not be present, was read to open the discussion. Dr. Ralph C. Larrabee spoke at some length, giving valuable advice upon many points, including training, condition, age, food, water, the use of alcohol and tobacco, and the care of the feet (see p. 166). Professor C. E. Fay gave interesting experiences from his own mountain climbing, and the discussion was continued by Messrs. Gleason, Pray, Carpenter, Curtis, Barton, Lawrence, Ritchie and Field.

March 20, 1903. — Special Meeting.

President Barton in the chair.

About two hundred and fifty persons were present.

Professor William Hallock, of Columbia University, New York, addressed the Club, his subject being "The Ascent of Mt. Whitney, California, with Special Reference to the Altitude Determinations and Related Subjects" (see p. 135). A large number of lantern views were shown, illustrating the long journey to the mountain, and particularly the summit itself, with its precipitous eastern face.

At the conclusion of the lecture, Mr. R. B. Lawrence showed views of Three Mile Island, Lake Winnepesaukee, including some taken in November and January last from the top of the new tower.

April 9, 1903. — Two hundred and twenty-seventh Corporate Meeting ;
held in Huntington Hall.

President Barton in the chair.

One hundred and sixty-five persons were present.

Miss Annie S. Peck gave her illustrated lecture, "Afoot and Alone in Tyrol." The earlier portion set forth her experience in the Tyrolean and

Bavarian Highlands, including the cities of Salzburg and Innsbruck ; the latter presented detailed accounts of her ascents of the Zugspitze by way of the Höllenthal, and of the Fünffingerspitze by the Daumenscharte. A large number of views were thrown upon the screen.

April 14, 1903. — Special Meeting ; held in Huntington Hall.

Vice-President Whitman in the chair.

About six hundred persons were present.

Mr. Harvey N. Shepard, Chairman of the Trustees of Real Estate, announced that Mary Lee Ware, of Boston, had given to the Club a farm, in Fitzwilliam, N. H., containing three hundred acres and including a tract of rhododendrons twelve acres in extent. It was voted that the thanks of the Club be extended to the donor for the valuable and generous gift.

Mr. Herbert W. Gleason addressed the meeting on "Mountain Photography : practical points for amateurs." Many subjects were discussed by the speaker, including lenses, plates and films ; the photographing of clouds, water, rain and snow, forest, ferns and flowers, geological structures, etc. The lecture was illustrated by more than one hundred lantern views made from negatives taken by the speaker last summer in the Canadian Rockies and a few taken by Mr. A. O. Wheeler of the Canadian Topographical Survey. Especially fine were the panoramas and telescopic views. A few monochrome lantern slides made by Signor Sella from his views in the Alps and Himalayas were also shown.

Officers for 1903.

President.

GEORGE H. BARTON, Society of Natural History, Boston.

Vice-President.

EDMUND A. WHITMAN, 1104 Pemberton Building, Boston.

Recording Secretary.

ROSEWELL B. LAWRENCE, Tremont Building, Room 745, Boston.

Corresponding Secretary.

JOHN RITCHIE, JR., P. O. Box 2795, Boston.

Treasurer.

RUFUS A. BULLOCK, Tremont Building, Room 1049, Boston.

Councillors.

Natural History, HARLAN P. KELSEY, Boston.

Topography, FREDERIC V. FULLER, Roxbury.

Art, MRS. LEWIS B. TARLTON, Watertown.

Exploration and Forestry, ALLEN CHAMBERLAIN, Winchester.

Improvements, J. STURGIS PRAY, Cambridge.

Trustees of Permanent and Reserve Funds.

ISAAC Y. CHUBBUCK. CHARLES H. FRENCH. REST F. CURTIS.

Trustees of Real Estate.

HARVEY N. SHEPARD.

J. RAYNER EDMANDS.

CHARLES E. FAY.

AUGUSTUS E. SCOTT.

ALLEN CHAMBERLAIN, *Ex-officio*.

Members added since March, 1902.

[Names of Life Members are printed in small capitals.]

- | | |
|---|--|
| Abbedananda, Swami, New York City. | Curtis, George D., New Dorchester. |
| Adams, Miss Lula G., Brookline. | Curtis, George W., Roxbury. |
| Allen, C. Torrey, Brookline. | Curtis, Mrs. George W., Roxbury. |
| Allen, Mrs. Edith Torrey, Brookline. | Daland, Tucker, Brookline. |
| Amory, William, Boston. | Dana, Wm. S., Brookline. |
| Atherton, Miss Lily B., Medford. | Davenport, Miss Anna M., Roxbury. |
| | Davenport, Mrs. Fannie A., Roxbury. |
| Baker, William L., Brookline. | Dodd, Edwin M., Providence, R. I. |
| Barbour, F. H., Cambridge. | Dowling, J. Alvin, Malden. |
| Barrett, Nelson M., Concord. | Drake, J. M'E., Boston. |
| Bartlett, Mrs. Dana P., Boston. | Duffill, Mrs. Amy H., Melrose Highlands. |
| Batcheller, Mrs. Margaret T., Brookline. | Dunbar, Miss Abbie May, Brookline. |
| Bergeson, John, Boston. | Dunbar, Miss Lillian, Brookline. |
| Blackington, Hugh P., Hoosick Falls, N. Y. | Dunbar, Miss Ursa, Brookline. |
| Blackington, Mrs. Hugh P., Hoosick Falls, N. Y. | Earle, Miss Louise S., Lynn. |
| Blanchard, Chas. F., Lowell. | Eaton, Wm. S., Boston. |
| Blanchard, Mrs. Chas. F., Lowell. | Edmunds, John, Wellesley Hills. |
| BOUTON, CHARLES L., Cambridge. | Ely, Miss Elizabeth B., Boston. |
| Bradbury, Miss Elizabeth R., Boston. | Emerson, Miss Winifred, Boston. |
| Bradley, Mrs. Fannie L., Charlestown. | Fall, Charles G., Boston. |
| Broughton, Arthur N., Jamaica Plain. | Farnham, Miss Mary A., Lowell. |
| Brown, Miss Alice W., Roxbury. | Farrar, Mrs. Hattie A., Boston. |
| Bryant, Henry L., Brockton. | Faxon, Arthur C., Roxbury. |
| | Fewkes, Ernest C., Newton Highlands. |
| Campbell, Edmund C., Boston. | Field, Miss Caro I., West Newton. |
| Carpenter, Charles L., New York City. | Fisher, Miss Sara L., North Attleboro. |
| Channing, Miss Eva, Boston. | Flagg, Miss Abby E., Boston. |
| Chapin, Horace D., Boston. | French, Frank H., Boston. |
| Chester, Mrs. Harry C., Brookline. | Fuller, Wm. C., Providence, R. I. |
| Cobb, Charles E., Providence, R. I. | Fuller, Mrs. Wm. C., Providence, R. I. |
| Cole, Miss Helen M., Boston. | |
| Condy, John A., West Roxbury. | Gannett, Mrs. Mary T. L., Rochester, N. Y. |
| Crocker, Mrs. John M., Cambridge. | Gibson, James S., Boston. |
| Cummins, Mrs. Roberta M., Charlestown. | Grover, Gregory M., Canton. |

Harnden, E. W., Boston.
 Hartwell, Miss Annie E., Melrose.
 Hartwell, Miss Maud A., Boston.
 Harvey, Wm. W., Roxbury.
 Haskell, Miss Edith, Dorchester.
 Hastings, Robert W., Brookline.
 Haven, Wm. I., Summit, N. J.
 HEALD, SIMPSON C., Boston.
 Hicks, Ernest A., Boston.
 Hill, Miss Caroline E., Malden.
 Hill, Wm. W., Concord, N. H.
 Hill, Mrs. Wm. W., Concord, N. H.
 Hills, Miss Harriet A., Somerville.
 Holmes, Miss Helen P., Cambridge.
 Holt, Wm. L., Boston.
 Hovey, Wm. A., Boston.
 Howe, Miss Louise, Brookline.
 Hubbard, Henry V., Boston.
 Humphrey, Seth King, Boston.
 Humphreys, Miss Elizabeth R., Dedham.
 Hyde, George L., Salem.
 Hyde, Mrs. George L., Salem.

Jackson, Joseph, Worcester.
 Jenkins, Miss Mabel A., Roxbury.
 Johnson, Mrs. Martha B., Phila., Pa.

Keay, Fred E., West Somerville.
 Keay, Mrs. Fred E., West Somerville.
 Kelsey, Mrs. Harlan P., Boston.
 Kennedy, Sinclair, Readville.
 Kimball, Miss Hattie A., East Hebron, N. H.
 Kittredge, Charles F., New Dorchester.
 Kittredge, Miss Louise P., New Dorchester.

Lancaster, Mrs. Stella C., Merrimac.
 Langmaid, Miss Bertha, Boston.
 Leatherbee, Miss Florence K., Newton Centre.
 Logan, Miss Mary J., Boston.

McCrudden, Francis H., Boston.
 McDonald, Miss M. Cora, Cambridge.
 McFarland, Mrs. Mary S., Boston.
 McInnes, Wm. M., Boston.
 MacKenzie, Mrs. Evelyn H., Boston.
 MacWhinnie, James E., Cambridge.
 MacWhinnie, Miss Louise I., Cambridge.
 Manson, Harold C., Dorchester.
 Manson, Miss Marion, Dorchester.
 Marshall, Miss S. L., Roslindale.
 Mason, Miss Grace W., Brookline.
 Mills, Charles, Winchester.
 Mitchell, Walter H., Boston.
 Moore, Miss Eva G., Cambridge.
 Morrison, Adelbert H., Brookline.
 Morse, Miss Mabel S., New Dorchester.
 Mosman, Mrs. W. B., Brookline.
 Murphy, Miss Grace E., Brookline.
 Murray, Robert M., New York City.

Newhall, Frederick H., Lynn.
 Nutting, Mrs. Lillian T., Allston.

Ordway, E. W., Brooklyn, N. Y.

Patten, Stephen K., Roxbury.
 Peck, Alva C., Boston.
 Perkins, Frederick H., Brookline.
 Perrins, John, Boston.
 Perry, Henry H., Brookline.
 Perry, Henry J., Boston.
 Pickard, Samuel T., Boston.
 Piper, Henry M., Malden.
 Platt, Miss Mary I., Brookline.
 Potter, Wm. H., Boston.
 Potter, Mrs. Wm. H., Boston.
 Prettyman, Virgil, Yonkers, N. Y.
 Prime, Harold A., Brighton.
 PRINCE, MRS. JOHN T., West Newton.

RANKIN, ISAAC O., Peekskill, N. Y.
 Rankin, John L., Newark, N. J.
 Rhodes, Miss Florence R., Boston.

- Rogers, Mrs. Edw. Little, Boston.
 Rorer, James B., Cambridge.
 Ronillion, Louis, New York City.
 Rousmanière, Miss F. H., Roxbury.
 Russell, E. Harlow, Worcester.
 Russell, Miss Kate S., Kearsarge,
 N. H.

 Sanborn, Miss Mary, Boston.
 Saunders, Miss Frances W., Brook-
 line.
 Seaver, Mrs. Frances C., Roxbury.
 Shove, Francis A., Malden.
 Smith, Miss Annie B., Lynn.
 Smith, Mrs. Evelyn B., Providence,
 R. I.
 Smith, Mrs. Morrill A., Boston.
 Stearns, Charles C., Hartford, Conn.
 Stockbridge, Mrs. Helen S., Balti-
 more, Md.
 Stone, Arthur C., Chelsea.
 Strongman, C. W. H., Auburndale.
 Swain, George F., Boston.
 Swan, Joseph W., Boston.
 Swan, Reuben S., Brookline.
 Sweet, Everett C., Everett.
 Sweet, Walter O., Everett.

 Taylor, David L., Jr., West Med-
 ford.

 Taylor, Wm. G., Medford.
 THAYER, FRANK B., Boston.
 Thompson, Willis D., Concord, N. H.
 Towle, Clifton A., Gorham, N. H.
 Turner, Chester B., Roxbury.

 Usher, Miss Isabel J., Cambridge.

 Van Baalen, Miss Frances, Roxbury.

 Wadsworth, Charles, Jr., Philadel-
 phia, Pa.
 Ward, Miss Katherine L., Lowell.
 Weed, Alonzo S., Newton.
 Wentworth, L. Roger, Somerville.
 Wetherell, Chas. B., Brookline.
 WHITE, AUSTIN P., Boston.
 Whitman, Mrs. Edmund A., Cam-
 bridge.
 Wight, Robert F., Roxbury.
 Williams, Joseph S., Jamaica Plain.
 Willis, Miss Florence G., Dorchester.
 Winchester, Miss Augusta S., Ja-
 maica Plain.
 Woods, Miss H. Maria, Concord,
 N. H.
 Woodworth, Mrs. Albert B., Concord,
 N. H.
 Worthley, George H., Brookline.
 Wright, Mrs. Geo. S., Watertown.





MT. GOODSIR FROM THE SUMMIT OF MT. STEPHEN.

From a telephotograph by Irving Langmuir.

APPALACHIA.

VOL. X.

BOSTON, APRIL, 1904.

No. 3.

Ascent of the Great Chogo Loongma Glacier, and Other Climbs in the Himalayas.

BY FANNY BULLOCK WORKMAN.

OUR object in going to the northwest Himalayas in the summer of 1902 was, if possible, to make a first ascent and exploration of the great Chogo Loongma glacier, which terminates above the village of Arondu in the upper Basha valley, Baltistan, and finds its source among some high peaks of the Mustagh range, one of which is a fixed peak 24,483 feet high. Colonel H. H. Godwin-Austen of the Indian Survey Department surveyed the lower third of the glacier in 1862, but the upper two thirds and the large terminal branch glaciers remained until our visit *terra incognita*, untraveled by human foot.

We left the capital of Kashmir, Srinagar, and after passing through the Sind valley and crossing the Zoji Pass to Dras, took the lower route, following the windings of the Indus in eighteen marches to Skardu. From there seven more marches, through the Shigar and Basha valleys, brings one to the foot of the Chogo Loongma glacier. The lower road proved a convenience to me, for without it I could not have reached the snows in time for our season's work, having sprained my ankle the evening before the date set for departure from Srinagar. By keeping quiet a week and being carried in a dandij a large part of the distance to Skardu, I was able to walk after four weeks. Still I was rather handicapped for a journey every step of which lay over pathless glaciers, peaks and passes, and, although I climbed as usual and never spared the foot, I was obliged to keep it bandaged for two months.

The chief members of our party were Dr. W. H. Workman, a German topographer, myself, Mattia Zurbriggen, guide, and Giuseppe Müller, an Italian porter. We were armed with an impressive *parwanah*, or letter from the Maharaja of Kashmir, ordering all chiefs and village headmen to serve us and provide coolies and provisions. This, and numerous letters from the Government sent out ahead, proved of much value, we being bound for a region where men were scarce, and less used to venturing on ice than were those even of Askole, the base of our former Himalayan exploration.

On the way to Skardu receptions, accompanied by music and floral gifts, were tendered us by the rajas of the larger villages, and in the smaller ones we were surfeited with nuts, dried apricots, and baskets of mulberries.

We remained in Skardu only long enough to collect coolies, then pushed on through the Shigar to the Basha valley, where we made a high camp at 14,700 feet for two weeks, with a view to doing some preliminary climbing before attacking the new glacier. This camp was quite above wood growth, on a rough rock and earth slope just below some permanent snow fields, and was reached by two days' scrambling up the wildest of mountain flanks, fording mountain torrents and crossing small glaciers. Abruptness is the characteristic of the mountains of the upper Basha and of the Chogo Loongma; even the lower slopes are almost invariably sharp.

At this camp we had a foretaste of the variable weather, which proved the *bête noire* of exploring parties of 1902. The Anglo-Austrian party which ascended the Baltoro glacier, desirous of making an attack upon K², appear to have had their plans much more interfered with than were ours, and the report was quite as gloomy from the Munich explorers in the Tian Shan range, Central Asia. Certain it was that for very high climbing, where numerous snow bivouacs had to be made, the season was unpropitious, the weather seldom remaining clear for longer than two days at a time. We camped here in a snow squall, and by the next morning a good foot of snow had fallen.

A day or two later, the weather having improved a bit, I climbed a snow and rock peak 16,500 feet high with guide and porter, which gave us some pretty rock work toward the last.

We returned to camp by another route over a succession of snow alopes, and here had the experience of sinking almost to the knees in snow, as early as 10.30 A. M., an occurrence many times repeated on our later tours.

Our next move was toward a fine snow peak to the southeast of camp. After much expostulation on the part of the coolies, we got them to carry our high-climbing kit over the lower part of the ascent to a snow field below the peak, at 17,100 feet. We camped here in the finest weather and were driven down by a sudden change in the night, after which it snowed for several days. At this high camp opportunity was offered for judging of the ilk of the Basha coolies. Instead of making a great hubbub and begging us to return to lower ground, a number of them quietly deserted in the night, leaving their loads to the kindness of whoever might be at hand.

All of the party, except the topographer, ascended a very interesting rock peak on July 23. Leaving camp early and crossing the snow fields above it, we next descended to a heavily seamed and broken glacier that drained the south side of an adjacent snow mountain. Bordering this glacier and rising almost straight from it were three fine rock peaks, the highest of these being our objective point. Nearly three hours were consumed in overcoming the intricacies of the glacier. This accomplished, we began the rock ascent, which was of steep pitch from the outset. The mountain was of the usual granite formation found throughout this zone of the Himalayas, but in this instance appeared strewn with a coating of rent and splintered shale slabs and boulders, difficult to surmount and for the first thousand feet rendering a secure foothold impossible. The dislodging of large stone blocks that went crashing down toward the glacier was a feature of this climb.

About noon we reached a narrow rock col between the main and lower summit, where we lunched. Warily traversing this, we attacked the chief peak, which was of more homogeneous substance and offered a very steep, but fairly substantial rock face. Two formidable gendarmes had to be propitiated toward the last, and at 1.50 P. M. we stood on the top, or rather took turns at standing there, there being room for only two at a time. The height of this mountain was 17,200 feet. All our heights

were determined by hypsometric readings compared with those of the Government mercurial barometer at the lower station at Skardu, where three daily readings were taken for us during the summer by an official.

The downward view to the north was startling : a clean sweep of two thousand feet of black rock ended in a great bergschrund, followed by a long snow slant that would greet with defiance any climber. Toward the south, Mustagh snow-giants loomed gloriously ; but dark thunder-clouds were rushing upon us from another side, and, after taking the boiling-point and aneroid observations, serious attention had to be given to the descent. Progress was slow, and before we reached the narrow col peal after peal of thunder reverberated among the peaks and a drenching shower of rain and hail beat down upon us. There are few things more nagging to the mountaineer than a difficult pathless rock descent in a thunder-storm. The need of hurrying is imperative and the necessity of the utmost caution equally so.

By the time the glacier was reached, we all needed a short rest to restore our strained nerves. The storm was passing by then, but the conditions for crossing the jagged slippery glacier were at their worst. With patience this was effected, and we reached camp after fourteen hours' absence. Chilled by wet clothes and still wetter feet, a temperature of forty inside tents is not very inspiring ; but the cook quickly brought hot tea, and with a Primus stove burning merrily in my tent I was soon as well off as in a Swiss hut.

Fearful lest the jarring elements should interfere with our main object, the ascent of the Chogo Loongma glacier, we next beat a retreat to the valley, and three days later in steady down-pour, accompanied by the village chief and our long caravan of coolies, passed through the small village of Arondu, and camped on a well-soaked grass slant almost under the grim snout of the glacier. Government chaprassies and the head chief of the district had been getting coolies together pending our arrival, and a day was passed, while the weather was again righting itself, in selecting the best-clothed and bravest-looking out of the motley lot. There was not much choice, but we sought to eliminate men who had not woollen garments. In doing this, as it proved, we

were not altogether successful, for on more than one occasion, far up the glacier a shivering coolie would present himself in a thin cotton shirt and, pointing hopelessly to his bare legs and feet, beg to be allowed to return to Arondu.

On the 27th of July we were off, the chiefs going in charge of the men and to show us the way, as they said, for three marches, for according to them beyond that there was no way! This fact we had surmised before, or we should have left Zurbriggen behind. From the little the chiefs knew about the matter, and particularly from our own observations, it became evident that the Chogo Loongma had receded a good deal of late years. Its end, now well above Arondu, formerly came down close to the village.

The height of Arondu is 9400 feet, and for the first three marches, so called, the glacier ascends gently. We crossed it, and after about two hours found a fair path along the flanks of the mountains, skirting the glacier, which is evidently used occasionally by natives for driving yaks and goats to high grazing ground, — although we met with but one stray yak as we ascended. The glacier runs in a westerly direction for about six hours, when a sudden bend occurs, and for the first time the long white sweep of the ice river is seen bearing north toward towering snow peaks. The lower twelve miles is lined on both sides by fine sharp peaks graced with hanging glaciers and occasional interesting side valleys; but the full grandeur of the scenery does not open out until at about fifteen miles, where the glacier makes another short westerly bend.

Space will not allow of description of our lower camps, and they have no special interest from a mountaineering point of view. The limit of wood is reached much sooner than on the Biafo glacier explored by us in 1899, and from "Last Wood Camp" at 12,200 feet all fuel for camp purposes had to be carried. During our stay of a month at higher camps, one of the chief cares and trials was the keeping of a band of men on the move to bring up wood. Unless led by the porter or a good leader, twenty sometimes would return after a two days' absence, with only enough for twenty-four hours. This may convey some idea of one of the difficulties met with when exploring a great Himalayan glacier beyond tree growth.

From "Last Wood Camp," after crossing a much broken line of glacier, we quitted the left bank, marching across the glacier, which is at this point about three miles wide. We wished to camp at the base of a mountain promontory of rock and snow peaks, piled one over another in chaotic grandeur. A difficult reach of séracs and crevasses on the other side occupied the guides for an hour with step-cutting to enable the loaded coolies, sheep and flock of goats to clamber through.

We pitched tents on the lower flank of a mountain which bore such a striking resemblance to the Zermatt peak that we called it the Asiatic Riffelhorn. The coolies and chiefs found some rocks at a short distance for their tents, while our live stock, guarded by an attendant, roamed at will over a short grass slope under the precipitous face of the Riffelhorn. We made the Riffelhorn Camp (18,500 feet) a general base camp for thirty days. The coolies soon learned to get through the séracs by themselves, although one, from disobeying the guides' advice and going under rather than over a sérac in the middle of the day, was fatally injured by falling stones. To this point wood was brought and collected, and from here mail men, after much complaining, descended to Arondu for letters and supplies. Fresh men were sent here, and here we left malcontents and extra boxes when on our further trips.

To the north of this group of peaks the Chogo Loongma makes a quick bend, ascending sharply over twelve miles in pristine splendor. On the southwest side another beautiful branch glacier has its embouchure, and stretches westward ten miles to a pass at the north base of Mt. Haramosh, 24,240 feet high. This glacier, which we called Haramosh glacier, we also explored, making a first ascent of its pass, 16,906 feet, which was called the Amar Singh La in honor of our friend Raja Sir Amar Singh, brother of the Maharaja of Kashmir.

Thus the Riffelhorn stands as guarding sentinel of the upper Chogo Loongma and of the beautiful west terminal branch glacier, and truly unrivaled is its position. With the guides and a coolie for carrying instruments we ascended the Riffelhorn (15,000 feet); and a fine rock climb it was, with enough couloirs and bad places to give zest to the ascent.

On the small rock-top we had hypsometer, aneroids, cameras,



THE ASIATIC RIFFELHORN.



GREAT SERAC NEAR RIFFELHORN CAMP.

From photographs by Dr. and Mrs. Workman.



ON THE UPPER CHOGO LOONGMA GLACIER.
SUMMIT OF CORNICE MOUNTAIN.
DESCENDING A SERAC.

From photographs by Dr. and Mrs. Workman.

and clinometer in use, and here we built a tall cairn which may be seen for miles up and down the Chogo Loongma. Mt. Haramosh, tipped with cloud, was photographed for the first time from the north side, as was the Chogo Loongma in its last great rise from 14,000 to 18,600 feet, and the snowy fixed peak looming arrogantly over its right shoulder, as well as several other magnificent snow giants of about equal height.

Thus revealed, as it were in a moment, lay the snow world of trackless ice-fields and peerless summits among which we were to live and sleep for several weeks. Zurbriggen, after a reconnaissance, reported one more chance, eight hours higher, for a camp where servants could be taken and wood used, so we started, leaving one chief, extra baggage and coolies and the sheep behind.

The glacier had to be crossed again toward the higher bend, and getting through the immense séracs with our caravan was hard work. We had a tragic scene on the top of a huge pinnacle while the guides were seeking a passage. The demoralized coolies, casting off their loads, pointing to their worn sheepskin boots, vociferating, begging to return, recalled like moments spent on the Biafo glacier. It was a critical time, but with firmness on our part and energetic action on the part of the chief and our head servant, the band was pacified after a time; and when the guides were ready they sullenly and slowly moved onward.

In the afternoon we left the séracs much higher up, and climbed about three hundred feet on a mountain flank to the place to be our camp for ten days. It was not an ideal camping-place, being so steep that it was necessary to prop bags and boxes up with stones to prevent their rolling down the mountain side, and it took two and a half hours for the men to dig away the soil and build artificial terraces for the tents.

The situation was magnificent. Above the slant we inhabited, rock precipices and snow slopes shot upward; the glacier, broken into a thousand pinnacles, lay at our feet, and on the opposite side immense snow peaks arose like ghostly sentinels. One of the most splendid of these peaks was a queenly mountain of 24,000 feet, which presented wonderful surfaces of sheer snow and wall precipices from the glacier to its culmination.

It was a mountain which always commanded attention from wherever seen. We called it "the Furrowed Peak," from the peculiar channeled appearance the snow assumed on its nearly perpendicular surface.

This camp at a height of 14,700 feet was called Sérac Camp, and we had a large cairn built two hundred feet above, where a record of all our doings on the Chogo Loongma were placed. The first move from here was to climb a mountain slightly above our camp for a wider view of the country.

There was more hard work on that mountain than on any I ever climbed of similar height. It was not an interesting rock face or snow wall, but a succession of rotten shale and scree-covered slants, rising at an angle of fifty degrees most of the time. After three hours' plodding over this surface, we arrived at the base of a nearly perpendicular snow wall, which happily was still (at 11 A. M.) in condition for step-cutting. Overtopping this we could see a wide, projecting, dangerous-looking cornice. Secretly wondering how this was to be overcome, we attacked the wall after leaving all superfluous kit and the coolie, whom Zurbriggen banished from the rope. Fearing to start an avalanche, we took the wall straight, and presently arrived under the cornice. Letting out a good length of rope, Zurbriggen proceeded to make friends with this, breaching it and treading it out as only an expert could, although I must say I expected to see the whole affair give way, bringing him with it.

Presently we saw him standing far above in an apparently safe position, calling to me to follow through the deep snow couloir he had somehow hewn out. This I did, and after an arduous tussle with the snow chimney, a big leap upward, accompanied by a sharp pull of the rope, brought me over an icy edge to a snow plateau. The others followed, and the remaining snow slopes to the top were quickly covered.

We have vainly regretted not photographing ourselves in that cornice, but so intent were we on mastering it that we forgot to take away what would have been an interesting souvenir. And after all the trouble of climbing a really difficult mountain, what did the hypsometric readings and after calculations give us for height? — only 17,814 feet. We had worked enough for 20,000, but hard facts must here be recorded.

The top was a harmless-looking snow plateau, backed by a glorious fixed peak of 24,400 feet. We saw a splendid vision of all the Chogo Loongma peaks, and beyond, the glittering coronet of Haramosh and its snowy sister fixed peaks of twenty-two and twenty-three thousand feet.

To the south K², forty-five miles distant, lifted its great pyramid-like form above a billowy sea of noble crests. Below, on the opposite side from our ascent, stretched a beautiful high glacier, another terminal arm of the Chogo Loongma, which we then and there decided to investigate. So that, after all, our peak, for which we have not yet found a name savage enough, proved worth the candle in spite of the fact that its mountain technicalities proved greater than its height.

Having crossed the Rubicon on the ascent, and proclaimed the victory to the Chogo kings, we passed through the crest-fallen cornice less tempestuously on the return. Particularly as the snowy upper world, under the heat of the noonday sun, was in its most tender liquid mood, and soft sizzling avalanches were already grooving some parts of the wall beneath.

The great shale slopes we treated more summarily than in coming up, when for the advance of every three feet we went back two. Now we simply dug in our heels and glissaded long passages until some ridge of rocks or snow barred our flight.

The final ascent of the Chogo Loongma had now to be accomplished, and it was decided to make immediate use of the seemingly fair spell of weather. From the peak we had been able to study the upper trend, and we realized how steep it was and that, with only a few men and high-camping kit, two snow camps would probably be necessary. Preparations were made, and twelve of the strongest coolies selected. No wood could be used, so we carried none.

The first day we succeeded in bringing the coolies to a height of 17,100 feet by 4 P. M., when they sank down exhausted. Great crevasses concealed by a heavy snow coating and difficult to avoid were the chief obstacles up to this point; but the march was a trying one, as from 11 A. M. the surface was rendered so soft by the intense heat that at each step one was plunged in snow to the knees, which, although their loads were light, tried the coolies severely.

During the march we unloaded seven or eight coolies, and, packing their loads on a light sledge made of Norwegian ski, had them try dragging this. The imported means of conveying their burdens, supposed to be easy, did not suit the Basha men, and they soon returned to their old method of carrying.

After camping in the centre of the glacier and taking the observations, attention was turned to melting snow for tea. Considering it takes at least eight times as long to boil snow as it does water, this process of getting a hot drink for the guides and ourselves was a prolonged one. Our food was from tins, and the cook, who had volunteered to come, although we asked no servant to go beyond where wood was stored, was of little use except as camp servant. The next day we left the camp and climbed to the head of the glacier to see if there was a chance of spending a night there, which it was important to do for the sake of observation. The glacier narrows somewhat, ascends rapidly, and is inclosed by a circle of almost perpendicular snow peaks. Large avalanches were falling on all sides; I think I never heard such a constant roar from them as on this ascent. Starting very early, we ventured to cross the beds of snow that had come down the day before.

At the top, which is 18,600 feet, we found a small snow area free from crevasses and safe, so the guide said, from avalanches, although to us it hardly seemed so, and here it was decided tents could be placed. By eleven o'clock the thermometer registered 180° Fahr. in the sun, and the glare and reflected heat were most oppressive even through veils and snow-glasses. On the ascent the snow had been crisp and hard and our progress good, but returning the surface was so softened that we sank in two feet or more, and with forced slow marching the need of keeping clear of the track of avalanches was imperative.

On reaching camp our cook and coolies were found deeply depressed. The weather looked somewhat doubtful, and without wood and water they refused to stay on. We insisted they should remain, — fully prepared, however, to have them go. The cook remained grumbling in his tent, but the coolies all departed, leaving us without resource had a storm broken. We had hoped to carry the camp up early the following day, but now there was no chance of doing that.

By 9 A. M. the next day twelve new coolies arrived under the charge of the porter, who had been sent down to fetch them, and we packed at once, notwithstanding it was late to attempt reaching the highest point. The cook and a tent coolie, looking rather ashamed, said they would return to the lower camp. We consented, and left with a set of untried ignorant men who had no idea of rendering the least service; but camp at the highest point we must, *coûte que coûte*.

I shall not soon forget the difficulties encountered in reaching that camp. The snow grew hourly softer, the coolies stopped every three minutes for long rests, we had to make detours to avoid avalanches that were sweeping the glacier constantly, and the heat was exhausting. It was necessary to cross very near the spot where an avalanche had just previously passed, and fifteen minutes after the men had dragged themselves over the place, another terrific one came down, rushing over the route we had traversed, leaving a trail of snow dust fully a mile long.

Usually we marched some distance in advance of the coolies, but this time we had to remain with them, talking, urging, threatening every minute of the way. All of us were glad when the top of the glacier was reached. A few coolies assisted in putting up the tents, but the majority lay flat on the snow groaning and complaining of illness, although I do not think they suffered except slightly perhaps with mountain lassitude.

The Chogo Loongma, 31 miles long, finds its source at 18,600 feet, under an abrupt icy wall which connects the great fixed peak of 24,486 feet with another of very beautiful form and nearly equal height, not as yet placed on any map. We called this wall the Pertab Singh La, in honor of the Maharaja of Kashmir. At its head the Chogo Loongma is 1100 feet higher than the Hispar pass at the top of the Biafo glacier, which we ascended in 1899. It is consequently much harder to explore and more dangerous than the Biafo, being scored by avalanches on most sides and at all hours of the day and night.

Photographs and boiling-point observations were taken during the rest of the day, and after the melting of snow was accomplished we turned into our sleeping-bags, it being very cold outside. We slept higher that night than we had ever slept before, at 18,600 feet, but I cannot say that the experience was pleasant.

It is difficult to sleep well after 18,000 feet, and here the watches of the night were broken by the pelting of snow and sleet on the tents, and the thunder of avalanches, which are a hundred times more gruesome at 2 A. M. than at 2 P. M.

The day broke fair, but soon clouded in and it began to snow. A speedy descent to Sérac Camp was begun, and in view of what followed it was lucky we left when we did. It snowed at intervals on the road back, and by the time we reached Sérac Camp the storm was fully established. It lasted sixty hours, blowing, snowing and threatening to take the tents from the slant where they were pinioned. We were imprisoned in the tents, inside of which the temperature varied from 40° to 30° Fahrenheit. On the second day the fifty-five coolies, who had sat up all night cooking chapaties in their tents and using up our small amount of wood, left *en masse*. How they dared go away in the storm alone, was a mystery to us who had so much trouble in bringing them to this point in fair weather. Thus was the first ascent of the Chogo Loongma glacier accomplished.

After the storm was over new coolies were sent up by the authorities at Arondu, and we returned to Riffelhorn Camp, where we proceeded to explore the three large terminal arms, which put to our credit fifty-five miles of virgin glacier investigated. The severe snow-storm referred to above, which occurred in the middle of August and was, considering its violence, quite out of season, produced exceedingly trying snow conditions on all the higher glaciers, — in fact rendered progress for some days on them impossible. Other shorter storms followed at intervals, well sustaining the reputation of the season as a treacherous one.

It is impossible in one article even to refer to the later trips, or the pleasures and trials in climbing and in the life at high camps, but of the ascent of the great ice wall at the head of Basin glacier, I must say a few words.

This was the high eastern branch glacier which we first saw from the peak above Sérac Camp. The second camp on this glacier, at 17,090 feet, was called "Crevasse Camp," out of respect to the huge crevasses that lay in wait for us whenever we went outside our Mummery tents. A short ascending snow

field was all that lay between them and the two-thousand-foot wall which it seemed folly to attempt, but over which Zurbriggen thought it was possible to find a road.

The day we ascended to this camp was another intensely hot one, 180° in the sun at 17,000 feet, and the sun lay so long on the wall and it was so near dusk when it began to freeze that the guides could not cut part of the steps, as they wished to do, the evening before. The extremes of heat and cold at high altitudes in weeks of tramping on snow and ice are very trying, and must be experienced to be appreciated. Arriving at a high base enervated by the height, often with a severe headache, one has to sit sometimes an hour or more in the wet snow awaiting the arrival of the coolies. When they arrive it takes a long time for them to unload, and before the small tents are pitched one feels almost unfit for the work of photographing and taking observations and notes. Tea is the great restorer; but, as I said before, the labor of procuring it is herculean. As a contrast to 180° in the sun at 2 P. M., we had a temperature of 9° at night, which was not exceptionally low.

Leaving the coolies asleep or at least quiet in their tent, four of us were off early the next day for the climb. The first snow fields, crisp and hard at that hour, were steep enough, but in half an hour we were at the base of the wall. For three hours we went straight up, cutting every step, except now and then when we climbed over a few jutting rocks. The angle, never less than 55° , was often at 60° , measured by clinometer.

Above the rocks where the shadow is seen in the photograph we halted for a bit of chocolate and a drink from our flasks, and then, bearing to the left, directed our steps toward the rock face, under which a little later we made a long and difficult traverse. We moved slowly, but steadily, never resting, for the outer coating of snow had become softened by the sun, and we sank in deeply, often striking an ice foundation. Zurbriggen went ahead, at about twelve feet of rope, cutting or tramping down the snow, and then, driving in his ice axe, took a firm stand and gave the order for me to advance. Nothing broke the silence of the slow upward march, except his repeated question, "Are you well placed?" followed by "Move gently, move gently." This we all tried to do, for we well knew the danger of starting

an avalanche on the fearful incline. The sun burned like a live coal, the few fleecy clouds scudding over the deep blue in no way tempering its ardor.

For any one inclined to vertigo the downward view would have been appalling, — a sheer sweep of two thousand feet of unbroken precipice to the abyss, where clung our Mummery tent, a green locust snared in a snowy lair. Five hours had passed, and we were still hard at work, halting only while the guide dug a way in the rotten snow or strengthened his hold on the melting ice beneath, and as the sixth hour neared its close we reached the crumbling ridge crowning the great wall.¹

It was a dizzy perch, with precipices behind and a bottomless chasm in front into which we dared not peer. A sea of splendid unnamed, unclaimed peaks spread to the east, some of which we recognized again later, on our visit to the fourth branch glacier. Beyond all these we knew the Hispar glacier was winding its icy course to Hunza.

Allowing only time for the barometric readings, Zurbriggen hurried us off, for there was not a moment to lose in beginning the dreaded descent. No photographs, no lunch, — there was no room where we stood, and no time. The height, based on later calculations, proved 19,260 feet, — not bad, considering it was the worst pass Zurbriggen said he had ever made, and there was not an easy place on it. This was a mountaineer's col, and not built of the fabric of some of equal height in Sikkim and Tibet, which a yak can climb if he has the wind.

Owing to the want of firm foothold, the descent was decidedly ticklish, and the utmost caution had to be used. We followed the old route for a time, and allowed ourselves, after an hour, ten minutes by the clock for lunch. This was sufficient, however, for it was unsafe to move about, and only a tin of meat and some biscuits were procurable. We crawled on again, the ice conditions growing steadily worse. The guide, who was behind, announced that his own hold was seldom secure, and advised us to drive in our axes and the long nails on our boots as firmly as possible. The climax came when the porter, who was number two on the rope, slipped and lost his footing. I automatically

¹ This wall has since been named the Bayākara La, Sanscrit for Pass Perilous.



THE FURROWED PEAK.



BAYAKARA LA (PASS PERILOUS).

From photographs by Dr. and Mrs. Workman.

drove in my ice axe as I felt the wrench, and closed my eyes, prepared to go. Luckily the others at that moment had a firm hold, and when I looked again, they stood stanch on their axes. Zurbriggen wound the rope about his, and shouted to the porter, dangling in mid air, to right himself.

At last he did, and we went on; but the moment had been a terrible one. The day was passing, and our progress perforce so slow that Zurbriggen said at last in despair: "We shall not get down to-night." This remark aroused our last latent spark of energy, and we replied that we must, come what would, for we knew that to be on that slant at night meant death. But he persisted in his opinion that we should not.

As the traverse grew more dangerous it was decided to attempt going straight down; and this meant, at that incline, stepping backwards for hours. The porter went first on the rope, treading out the deep soft snow, and we followed, looking over our shoulders at every step to see that our feet went into the right holes, that no slip should occur. This movement, continued for hours, was quite as nerve-wearing as any of the other snow tactics we had been forced to indulge in that day. But as the shadows lengthened, the distance between us and the tents diminished; and by 6.30 we had taken our last backward step and were crossing the hardening snow fields, grateful to a kind fate that had not left us on that grim wall over night.

The Alps of Montana.¹

BY FRANÇOIS E. MATTERS, U. S. G. S.

To the west-bound traveler on the Great Northern Railroad, weary with the vacant vastness of the Plains, it is a distinct relief, towards the end of the third day, to behold a long range of bold mountains silhouetted against the western sky. From away in the north to far in the south they stretch unbroken, like a formidable barrier across his path. No gap presents itself; yet the train speeds unswervingly upon its westward course. How will it surmount this obstacle? One involuntarily regains

¹ Published with permission of the Director of the U. S. Geological Survey.

interest in the journey; one begins to look forward to a welcome diversion. But the distance is deceiving; it takes a whole afternoon to approach these mountains, and just as the train begins to climb the foothills and the riddle is about to solve itself, darkness sets in and coldly wipes out the landscape. Only the listing and creaking of the heavy cars as they round sharp curves, the laboring of the engines, the occasional roar of trestles and rattle of tunnels mixed with the subdued swish of rushing water, remain to tell their story.

Little does the traveler suspect, on awakening the next morning in the broad, sunny valley of Spokane, that he has been carried while asleep by the borders of one of our grandest mountain regions, and within ten miles of some of the largest glaciers in the United States. Strange to say, these Alps of ours, notwithstanding their proximity to one of the great transcontinental railroads, are barely known to-day.

A few years ago it was the author's good fortune to spend two seasons in this section of the Rocky Mountains, exploring it in detail and mapping its eastern part for the United States Geological Survey. Thoroughly impressed with its scenic magnificence, and with its potentiality as a future field for glacial studies, he purposes to give here a brief general sketch, in the hope that it may help to direct the attention of all lovers of mountain scenery and students of mountain sculpture to this so long neglected region.

Its geographic boundaries are simple and well defined. In general outline it resembles a parallelogram, whose north side follows the Canadian boundary line; the south side being formed chiefly by the valley of the Middle Fork of the Flathead River and the Great Northern Railway; the east side by the plains of Montana, and the west side by the broad valley of the North Fork of the Flathead River. The total area is, roughly, 1500 square miles. It is traversed by two parallel mountain ranges, trending northwesterly and southeasterly, separated by an irregular longitudinal depression. The eastern or Lewis Range is the northward continuation of the long front range of the Rockies, extending from near Helena to the Canadian boundary, where it abruptly ends. Its steep east flank, descending to the level of the plains without any outliers, is interrupted by a series

of wide and deep lateral valleys; while its west side is of an irregular but generally less indented character. The western or Livingston Range, on the other hand, is the southward prolongation of a Canadian range, terminating a short distance north of the Middle Fork of the Flathead River. Most of its deep lateral valleys open westward.

Structurally, both ranges should be considered as parts of a great block of Algonkian strata superimposed by a gigantic overthrust fault upon the Cretaceous beds of the Great Plains; the central longitudinal depression being conditioned by a second, normal fault. Both ranges are deeply dissected, the valleys having all been extensively glaciated and transformed into steep-walled canyons. The depression between the ranges is by no means a simple trough. Near its centre stands a low timbered mesa, Flattop Mountain by name, probably a remnant of a former valley floor, now greatly modified by ice work. To the south its waters drain into Lake McDonald, a sheet of water nine miles long, tributary to the Flathead River; to the north they collect in the famous Waterton Lake, tributary to the Saskatchewan. The main Continental Divide, which comes from the south along the Lewis Range, crosses over on Flattop Mountain, ten miles south of the Canadian boundary line, and leaves this country on the crest of the Livingston Range.

The vagaries of the Divide, and the intricacies of the general scheme of drainage of these mountains, may be more readily understood by an inspection of the accompanying sketch map. No wonder that they were the despair of the cartographers of former days. A glance at our school geographies and even government maps of a few years ago is sufficient to reveal their striking disparity with the new detailed topographic sheets made since 1900. Nor is it so long ago since it was a matter of course in the minds of our best-informed citizens that the Mississippi system should drain the entire east front of our Rockies. Little was it suspected that another master stream should contest this right and carry off an appreciable share of the waters from the perennial snow fields of this country, to empty them into Hudson Bay. With the Columbia and the Missouri, the Saskatchewan claims a portion of our Rocky Mountains. Its principal branch in Montana, the St. Mary River, proceeds from a

cluster of glaciers in the heart of the Lewis Range, and, flowing along the east front of the mountains, collects the waters of Swiftcurrent and Kennedy Creeks — all glacier-fed — and leaves this country a powerful, though young stream. And the Missouri's nearest representative, the Milk River, in the meanwhile makes a miserable début on the dry prairie, a few miles farther east. However, Uncle Sam has his eye on this peculiar corner, and there is talk of correcting the mistake and retaining some of that precious snow water for the benefit of our farmers. This will involve no less a task than to divert it over a continental divide — but when there is a will there is a way. One cannot undertake much in this neighborhood anyhow without sooner or later striking a continental divide. No wonder, for here are the head waters of three great river systems emptying into the Pacific, the Gulf of Mexico, and Hudson's Bay respectively; and from the common corner of their basins radiate three continental divides.

Two mountains stand out conspicuously from the body of the chain, as one approaches over the plains. The northernmost, a singular, lone citadel of rock, Chief Mountain of Indian fame (9065 ft.), the great landmark of the International Boundary; the other, 20 miles farther south, of symmetrical, triangular form, known as Divide Mountain (8647 ft.), the guardian of the St. Mary Valley. From its base northward stretches a long smooth ridge, the culminating height of the prairies, the divide between the Saskatchewan and the Missouri. Immediately west of it, in a wide and deep glaciated trough, lie the two St. Mary Lakes, together twenty miles in length, called into existence by the obstructing alluvial fan of Swiftcurrent Creek. The petty strife now going on between the waters of St. Mary River and Swiftcurrent Creek seems but a faint rehearsal of the titanic struggle between the two great valley glaciers that once met at right angles on this same spot. The Swiftcurrent Glacier not only blocked the right of way of the St. Mary Glacier, but even compelled the latter to seek an outlet for its accumulating mass by forcing part of it out of the trough and over the Hudson Bay Divide. In testimony whereof its moraines are left on the top of the broad ridge encircling Duck Lake.

Of the numerous lateral valleys which debouch upon the

Plains, Swiftcurrent Valley is by far the most accessible. A brief mining excitement in the heart of the range several years ago has resulted in the opening of a rough wagon road up this valley and the establishing of a few scattering mining camps. Altyn, twelve miles up, is a convenient base from which excursions may be made up the various side canyons which radiate from it, as well as the neighboring peaks.

The valley, which below Altyn is several miles in width, here suddenly contracts; the flat-topped, cliff-girt mountains close in and become higher and more diversified. Through the gaps of the side canyons a variety of distant snow-flecked forms appear; dome-shaped, rounded masses alternate with sharp-crested ridges and bold angular pinnacles; smooth gentle slopes of an older topography abruptly end in precipitous cliffs of glacial cutting, hundreds, often thousands of feet in height. The general scheme of coloring, nowhere harsh, is exquisitely blended; the subdued yellows, grays, browns, and purples above timber line, relieved by occasional patches of snow, make way farther down for the sombre greens and blues of the forested slopes and bottoms; while in the background shimmer long-drawn névé fields and crevassed glaciers.

South of Altyn there opens a narrow, dark canyon, of pronounced U-shape, which seems hewn into the mountains. From it emerges Canyon Creek, a turbulent mountain stream. Only four miles long, this remarkable canyon terminates in a cul-de-sac, a profound amphitheatre, inclosed by the steep walls of Mt. Allen (9355 ft.) on the north, the twin peaks of Mt. Siyeh (10,004 ft.) on the south, and the high ridge connecting these mountains on the west. From the main summit of Mt. Siyeh, a cone which has been halved by the recession of the canyon wall, down to the little glacier lake in the bosom of the cirque, there is a drop of 4200 feet, the upper three fourths of which are almost sheer. The greatest width of the cirque, measured from the top of Mt. Siyeh to that of Mt. Allen, is barely two miles. In the bottom of this deep recess, by the lakelet and not far from the remnant of the once powerful glacier that ate into the core of these mountains, lies a small mining camp, seldom favored by the sun. Mt. Siyeh is easily climbed—by trail part of the way—and to those who have the time, its ascent is

to be recommended. The view from the summit is superb in every direction.

Let us next investigate the North Fork of Swiftcurrent Creek. No road leads up its canyon; only a trail winding through dense forests, full of prostrate trees, rocks, and bushes, exasperating to ride over for those unaccustomed to traveling through the Rockies, yet a mild preparation for what is in store for them in those parts of the range where trails are merely hinted at. Like Canyon Creek, this tributary is short (about five miles) and heads in a cirque of considerable depth. Long before we reach the same, our attention is attracted by a high serrated crest to the north, ornamented with spires and pinnacles. There are many miles of this ridge, faced uniformly with precipitous cliffs surmounting steep talus slopes. Of course, you will argue, this is the front of a mountain of considerable body, descending in gentler slopes on the other side. Not so, however. The two sides are very much alike. These spires, most of them over two thousand feet above the valley, surmount a narrow comb-ridge, a thin partition of rock, a gigantic arête. On the other side lies the much deeper valley of Belly River, with its lakes, cirques, and glaciers.

The effects of glaciation in these valleys are most pronounced. Favored by the softness of the shaly, sedimentary rocks, the transformation of their cross-sections from the original V-shape to the U-shape has been unusually thorough and complete. That this transformation has been accomplished largely through widening, and only incidentally by deepening, is strikingly evident in this region, where the mountain masses between adjacent valleys have often been reduced by lateral cutting to such attenuated forms as the comb-ridge just mentioned. The valleys have been widened at the expense of the intermediate mountains; so much so, indeed, that the impression which grows upon the traveler as he becomes more familiar with this country is that of a network of broad valleys separated by narrow ridges and tapering peaks, with concave profiles, rather than of a mountain chain furrowed by canyons and gulches. It is further to this gradual evolution of broad-bottomed, U-shaped canyons by lateral cutting, in a material naturally inclined to split along vertical planes, that the numerous, steep cliff-walls

owe their origin. It is the preponderance of these cliffs that constitutes the distinctive characteristic of the region, and gives it a facies wholly its own. Neither the Cascades nor the Sierras are particularly noted for the occurrence of such walls.

Continuing up the trail, through stunted and sparser timber rising from a carpet of dense, luxuriant grass, we finally step out on the shore of a small lake of a startling, turquoise-like blue. On its surface, half a mile across, numerous cakes and fragments of grayish ice are drifting about with the wind. A muffled report from the opposite shore directs our attention to a small, dirt-stained glacier advancing into the lake, from whose front a portion has just detached itself and is bobbing in the water, a new addition to the fleet of miniature icebergs. It was the author's privilege to witness the launching of several of these one fine day in August. He had reached the lake on foot by a less convenient, though more interesting route over the high rock-terraces on the west side of the valley; and from his elevated position he had a general view of the amphitheatre which has left an indelible impression. The strangely colored lake with its white floes, and the gray glacier with its delicately tinted crevasses, contrasted strikingly on the one hand with the intense green of the valley-floor, and on the other with the sombre browns and purples of the huge encircling rock walls, rising almost sheer from the water's edge. The long row of minarets, gradually increasing in height back of the glacier, finally culminate in the cathedral-like form of Mt. Wilbur (9298 ft.) on the south side of the cirque. It is mainly the cool shadow of this peak that has lengthened the life of this dwindling remnant of glacial power, and has preserved it at an altitude far below that of most ice-bodies in this latitude.

While traveling up the Swiftcurrent Valley below Altyn one constantly faces a distant expanse of snow and ice framed by dark mountain forms. Indeed, it may be observed even from Duck Lake, out on the plains. This is the Grinnell Glacier, one of the larger glaciers of the Lewis Range. It was named in honor of George B. Grinnell, who was one of the first to explore these mountains.

A trip up Mt. Grinnell (8838 ft.), which flanks it on the north, is rewarded by a splendid view of this glacier and its

peculiar setting. It covers a series of broad flat shelves with an aggregate surface about one mile square, the ice descending in irregular cascades from the higher to the lower shelves. Around its upper end stretches a serrated comb-ridge, known as "the Garden Wall," connecting Mt. Grinnell on the north with Mt. Gould (9541 ft.) on the south, and forming for several miles the crest of the Continental Divide. A short distance in front of the glacier its shelving site abruptly terminates in the precipitous, curving walls of a deep amphitheatre. A pretty green lake — Grinnell Lake — lies in its middle, surrounded by dense woods.

The occurrence of a living glacier on an elevated shelf overlooking a cirque of large proportions — now devoid of ice — is a feature which is frequently met with in these mountains, often on a much grander scale than that exhibited at the Grinnell Glacier. While the high shelves have undoubtedly been occupied by glaciers for much longer periods than the lower amphitheatres, the latter have been much more profoundly sculptured and altered from their antecedent forms, having been subjected to the action of vastly greater masses of ice. It is these large lower amphitheatres or mother-cirques that should be considered as the principal sources of the great valley glaciers of former days.

Continuing up Swiftcurrent Creek, along a rough, winding trail, past a series of small lakes of glacial origin, we finally reach the foot of the Swiftcurrent Pass. A climb of two thousand feet brings us to its summit, on the crest of the Lewis Range. The trail is steep and badly laid, zigzagging through stunted, snow-crushed fir trees, over dangerous step-like ledges and even over large banks of snow. The bones of more than one ill-fated pack horse lie bleaching among the bushes near the base. However, it seems decreed that the crossing of the Divide shall be fraught with hardship and danger wherever it be attempted. From the Lewis and Clarke Pass northward, no more wagon roads are found leading over it for two hundred miles, — until one reaches the Crow Nest Pass in Canada. Only an occasional dim pack trail, traveled but once or twice a year, and generally full of dead timber, is all that is available. The Swiftcurrent Pass in particular has a bad reputation; yet



MT. PINCHOT AND MT. JAMES.

From photographs by François Matthes.



MT. GOULD AND GRINNELL GLACIER.



MT. JACKSON AND BLACKFOOT GLACIER.



THE UPPER ST. MARY LAKE.

From photographs by François Matthes.

its position is such as to make it a desirable route for any one who wishes to enter the mountains from the east.

Before we begin the descent on the west side, let us climb the rocky knob south of the pass. Immediately below us, on a sloping shelf overlooking a precipice a thousand feet deep, lies the Swiftcurrent Glacier. Like the majority of the shelf-glaciers, it is considerably wider than long. This general ratio of width to length is imposed by the nature of the site. The latter often extends for the distance of a mile or more along the mountain side like a narrow terrace. The Swiftcurrent Glacier, while it no longer covers the entire shelf, — and thereby shows signs of shrinkage, — still has the maximum length which it can attain, its mile-long ice front being close to the border of the precipice. The distribution and direction of its crevasses, by the way, should be of interest to all students of glacial motion.

North of the pass and east of the Divide is a similar, though much smaller ice-body, also situated on a narrow shelf over a profound dark amphitheatre.

From the small peak on the north side of the pass an impressive panoramic view may be had. To the east, between Mt. Wilbur and Mt. Grinnell, one looks down the long trough-like Swiftcurrent Valley. To the south stretches the Garden Wall, — seen partly endways from here, — meandering about until it loses itself among the distant peaks of the Divide. From southwest to northwest, across a wide, timbered depression, extends the Livingston Range, a solid, unbroken chain. Among its more conspicuous elevations, Heavens Peak (8994 ft.) and its mate Mt. McPartland (8840 ft.) are the first to attract the eye. Richly bedecked with glistening snow fields and névé glaciers about their summits, they rear themselves above the dark canyon-valley of McDonald Creek with infinite repose and majesty. Northwest from them, black and menacing, looms up Longfellow Peak (8890 ft.), a Matterhorn-like tooth, the evanescent remnant of a once more massive pile. Farther away in the northwest, the sharp leaning cone of Vulture Peak pierces the sky, the highest-capped wave in a sea of snow-flecked peaks and ridges. Turning still farther north, the eye finally dwells on a multitude of high, jagged, and bizarre forms, culminating in the lofty and massive dome of Mt. Cleveland (10,488 ft.), a

veritable citadel surrounded by formidable walls. It is here that the boldly angular, hewn character of these mountains seems to reach its acme, and that the ever-present cliffs attain the greatest height and verticality. Here, too, on the east flank of Mt. Cleveland, may be found one of the most magnificent amphitheatres of the entire region, whose almost featureless head-wall measures no less than four thousand feet in height.

This section may be most conveniently reached by following up the Middle Fork of Belly River. The three prongs of this river, which is a tributary of the Saskatchewan, head in the neighborhood of Mt. Cleveland and traverse the northernmost end of the Lewis Range.

Space does not permit to enter here upon a tour through these magnificent but utterly wild and secluded valleys. In a general way they are patterned after the Swiftcurrent Valley, of low gradient and densely forested. Chains of picturesque lakes and meadow-like grassy parks, the haunts of deer, elk, and moose, extend through all of them, ideal places to camp in.

For those who wish to reach the Belly River country from the south, a trail leading from the Swiftcurrent Pass north and back over the Ahern Pass is available; but, owing to its generally dangerous nature, and the fact that it crosses a rapidly sloping glacier on which pack trains are liable to meet with disaster, this route is generally avoided. None but those inured to the hardships of the wilderness and experienced in the handling of pack animals should venture upon it.

Along the west foot of Mt. Cleveland, full six thousand feet below its summit, flows Kootena Creek in its deep glacial trough, emptying a few miles further north into Waterton Lake. This sheet of water, some twelve miles long, lies at right angles to the International Boundary Line, which almost bisects it. Although locally best known by its Canadian name, — Waterton Lake, — it has often figured under that of Chief Mountain Lake on maps made in this country. Like Chief Mountain, it is one of the great landmarks of the International Boundary; nevertheless, there is no good reason for retaining this second name, for there is no relation whatsoever between the lake and the mountain, the two being separated by the entire width of the Belly River basin.

Few lakes in the United States are more thoroughly hidden away in mountain fastnesses ; few are more deserving of a pilgrimage through the wilds. Ensconced among stupendous, towering mountains, grouped with the felicitous audacity of a Japanese background, it supersedes in the mind the image of any other lake that can be recalled.

Turning south from the Swiftcurrent Pass and down the valley of McDonald Creek, one enters a dense, gloomy forest through which the trail winds with difficulty. Here will be noticed hemlock, arbor-vitæ, tamarack, and other species unknown to the east side of the range — sure indications of a moister, milder climate. A whole day one may follow this valley and not find a single sunlit opening ; it is one continuous expanse of forest, chilly and depressing, although an occasional view of McDonald Creek, dashing madly over moss-covered boulders, relieves the monotony of the trail. It is not a trip to attempt without guide, for not only is the path dim and frequently obliterated by windfalls, but camping grounds with pasturage are practically absent ; so that the traveler unacquainted with the route may find himself compelled to camp at sunset in a damp and undesirable locality, where his weary pack animals will have to stand hungry all night, tied to a tree.

The trail ultimately leads to the head of Lake McDonald, where a hotel of rather modest appearance suddenly comes into view. Situated in a small clearing uncomfortably full of four-foot stumps, it does not impress one as a particularly cosy hostelry ; but after two days through the sombre forests, emerging as from a long tunnel, one feels quite willing to overlook a few things.

Here one meets tourists from Columbia Falls, Kalispell, possibly Spokane. The daily news comes from the west ; Great Falls and the eastern plains generally are not known. Mountains and gaps which you have learned to know by certain names from the east side of the range are here pointed out to you under a wholly different nomenclature. The prevailing impression seems to be that those heights are visible from the west side only, and that the Continental Divide itself lies, as a matter of course, a long way beyond them, a myth, more than a reality.

From the hotel a few trips may be taken that no lover of scenery and mountaineering should miss. One of these is to the

summit of Mt. Brown (8541 ft.), the nearest mountain, and perhaps one of the least difficult to climb. It stands 5400 feet above the lake, and commands a fine panoramic view of the two ranges and the valleys of the branches of Flathead River. To the northwest, across the mile-deep valley of McDonald Creek, arise Heavens Peak (8994 ft.), Mt. McPartland (8840 ft.), and Mt. Stanton (7744 ft.), successively descending southward and finally breaking off into a low undulating country, almost uniformly timbered, stretching from Lake McDonald westward to the North Fork of the Flathead. East of the lake, the relief is more pronounced, yet its individual features, often a thousand feet or more in height, appear like mere hills alongside of the ponderous mountains of the Lewis Range and the other, less jagged ranges south of the Middle Fork.

Turning east we behold a bewildering array of lofty, boldly sculptured peaks, all descending to the south in long rocky spurs. Nearest to us are Mt. Edwards (9055 ft.) and Gunsight Mountain (9250 ft.), almost in line with each other; behind them looms Mt. Jackson (10,023 ft.), a splendidly proportioned mass, generously ornamented with glittering *névé*. Then comes a host of minor craggy heights, each with a decided individuality of its own; and beyond them all, dominating the entire assemblage, rises the towering form of Mt. James (10,155 ft.), second only to Mt. Cleveland in height.

Immediately north of us, between Mt. Brown and Mt. Cannon, almost a mile in depth, lies Avalanche Basin, the most superb amphitheatre of its kind in the region. One scarcely knows which to admire most, the sparkling green lake with its wooded shores, the great cirque wall, with its slender silvery cascades, or the dazzling glacier in its frame of sharp-crested peaks. Aside from its scenic grandeur, Avalanche Basin is of special interest as an exceptionally fine example of a mother-cirque dominated by a glaciated shelf. Not only are its features distinct and symmetrically developed, but they are modelled on a grand scale. The lower cirque is almost four miles wide, measured from peak to peak, and fully five thousand feet deep. The lake is nearly a mile long in the direction of the valley axis. The top of the head-wall is nowhere less than 2500 feet above the lake; while the glacier, whose front is half

a mile back from the edge of the shelf, has a width of one and one-half miles and a length in the direction of its flow of fully one mile.

A favorite route to this fascinating locality leads from the hotel up Sprague Creek, in whose grassy, elevated cirque a convenient camping place for the first night may be found. The second day one climbs the col at the head of the cirque, between Mt. Edwards and Gunsight Mountain, and descends across the gently sloping surface of the Sperry Glacier to the edge of the shelf, and then down the face of the great cirque wall of Avalanche Basin, by a route which was originally intended for the sole convenience of the inhabitants of the region, viz., the mountain goats, and is to be traversed for a distance on all fours. A copious shower bath under one of the silvery cascades adds to the romance.

The lake has been known for some time to local pleasure seekers as an excellent fishing resort, and every summer a permanent camp is erected on its shores for the accommodation of tourists. It can be reached on horseback from the hotel via McDonald Creek valley in about five hours.

It is at present the only gem of these mountains whose fame is beginning to spread in the land; and photographs of it are growing popular in the cities of the Northwest. It is to be hoped that geographers and mountaineers in this country will in the near future take advantage of its comparative accessibility to acquaint themselves with it, and in so doing get a peep into this marvellous and so little known corner of Montana.

Avalanche Basin has been described in an earlier volume of this magazine by Dr. L. B. Sperry,¹ one of the first to visit it; and it is therefore not wholly unknown to the present generation of mountaineers. No further space will be devoted to it here, since after all it is only one of a great many wonderful spots of this region.

One thing, however, I wish to dwell upon, as we leave it, and reënter the valley of McDonald Creek. No appreciable discordance exists at the junction of Avalanche Basin and the

¹ "Avalanche Basin, Montana Rockies," by Dr. L. B. Sperry, *APPALACHIA*, Vol. VIII., No. 1, January, 1896.

valley of the parent stream ; the two meet sensibly "at grade." This may be somewhat surprising in view of the great difference in extent of their respective drainage basins. A short tributary valley like Avalanche Basin would generally be expected to debouch at a considerable height above the floor of the main valley. Hanging valleys are in fact the rule in these mountains ; they may be seen on every hand. Mention has not been made of them so far, as no particularly fine examples have been passed on our route. Later on we shall have a better opportunity to contrast the types of discordant and accordant valleys, in a locality where both are represented side by side.

Besides the excursions to Mt. Brown and Avalanche Basin, trips into the Livingston Range may be conveniently taken from the hotel on Lake McDonald. The principal avenue of approach leads up the North Fork of the Flathead, from which side-trips may be made up the lateral valleys on the west side of the range. Each one of these is worthy of a visit. No attempt will be made here to describe them individually ; but the one feature they have in common, and that distinguishes them from the valleys of the Lewis Range, deserves to be mentioned, namely, the chain of narrow elongated lakes, some of which are many miles in length, and which often afford the only thoroughfare between the steep and densely wooded mountain flanks.

The most remarkable section of the range is that nearest the Canadian boundary, known as the Kintla Lake region. Beyond the lakes, in a high, sequestered valley surrounded by bold craggy mountains, lies the great Agassiz Glacier, perhaps the largest ice-body in our Rockies, — and also the least known. Strange that this gem of ours should so nearly have lapsed into oblivion !

But let us complete our tour of the Lewis Range ; it too has treasures that need to be rediscovered.

The trip down Lake McDonald, on a steam launch, is liable to prove monotonous. For nine miles one glides between uninteresting, low, and thickly timbered shores. If, moreover, the season should happen to be well advanced, the chances are that a heavy pall of fog — which promptly gathers every morning in the fall, in that excessively damp country — is hanging

on the lake, just high enough above the water so one can see the shore-lines and can shape one's course.

Arrived at the lower end of the lake, we dive into a dank, mouldy forest of arbor-vitæ, fir, and tamarack, seemingly solid on either side of the muddy road, and of a gloom and mystery more dreadful than ever was depicted in a fairy tale. In about one hour Belton is reached, on the Great Northern Railroad, where a picturesque wooden bridge spans the Middle Fork of the Flathead River.

Lake McDonald has been much advertised by the railroad for its fishing as well as for its scenery; nevertheless it seems doubtful whether it will ever gain renown—except as a convenient gateway into the mountains. Its immediate surroundings are unattractive and even commonplace; while the great sea of timber which reaches down uninterrupted to its very shores is utterly devoid of charm.

From Belton one can travel up the Middle Fork of the Flathead to Nyack station, and thence up Nyack Creek to the Cutbank Pass. The author made a memorable trip over this route—westward—and the perplexities he had dodging railroad trains, trestles, tunnels, fallen timber, bogs, forest fires, and the swift river, with his pack train, will ever remain vivid before him. Nor is it a route that he would recommend to any except those who find it necessary to cross the range late in fall. For, after all, the Cutbank Pass is the least difficult to cross and remains open for a longer period each year than any of the other passes. The Marias Pass, through which the railroad is located, is not available for overland travel at all.

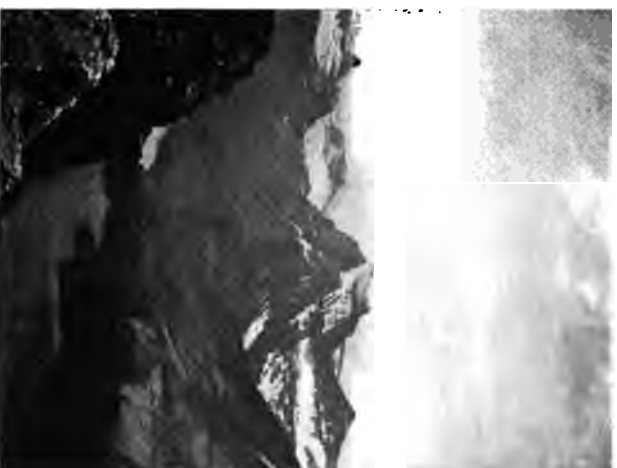
Returning to the east side of the range via the Cutbank Pass, one has a chance to make a visit to that interesting locality whose waters drain into three oceans. This place, the Crown of the Continent, as the advertisements have it, and described by some as a majestic snow-capped peak, turns out in reality to be a modest, unobtrusive, triangular knob, connected by three low cols to the adjacent mountains on the three divides. It is situated only four miles north of the Cutbank Pass. Its altitude happens to be 8001 feet. Aside from its geographic importance, it is of interest for the topography of its immediate surroundings. The great cirque on its east side, especially,

deserves detailed study. Not only does it present the usual shelf (in this case covered only by snow-drifts), but the latter is indented by several lesser cirques opening from 1500 to 2000 feet above the lake in the bottom of the main amphitheatre. These may be considered as the glaciated heads of radiating terminal ravines or gulches, dismembered by the recession of the main cirque wall which owed its origin to weathering in "bergschrunds," probably first located near their junction.

The route up Nyack Creek leads for a considerable distance along the base of Mt. James (10,155 ft.), a monumental and most impressive mountain, whose precipitous flanks drop a full six thousand feet in a distance of a mile and a half. Numerous remnants of glaciers hang in festoons about the cliffs on its north side, reflected by the glassy, sky-blue lakes below them.

From the Cutbank Pass we descend eastward to the plains by the valley of Cutbank Creek, a pleasant, sunny valley, wholly different from those we wearily fought our way through, are in hand, west of the Divide. Here lovely parks, fragrant with flowers, alternate with clumps of firs and pines. The yard-long, melancholy beard-mosses, and prodigious, fleshy lichens of the McDonald Creek trail are altogether absent. We are fast approaching the arid belt, the treeless prairies.

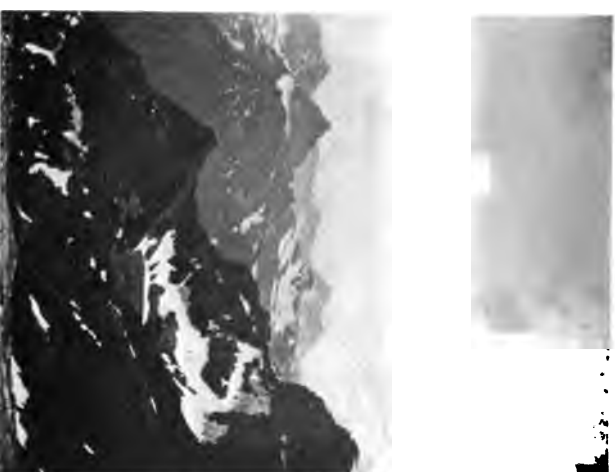
Returning to the St. Mary River with its two beautiful lakes, on the east flank of the Rockies, let us complete our tour with an excursion up its little frequented valley. Crossing the St. Mary between the two lakes over a frail, rickety bridge, we follow a dim, rough wagon-trail along the north shore of the Upper Lake. For six miles it traverses a succession of sloping, grassy alluvial fans, parted by numerous rivulets densely grown with aspen thickets; then it stops at a lone cabin in a delightful, verdant park. Ahead of us, a high, rocky reef, fringed with firs, descends gradually towards the lake and projects into it, at right angles with the shore. A similar but lower reef emerges on the opposite side and slopes up to the base of Red Eagle Mountain (8825 ft.). Ascending the ridge by a steep, zigzagging trail, we get a more comprehensive view of the lake and the restriction produced in it by the two reefs. These are seen to consist of a series of hard strata of limestone, dipping strongly to the west and cut off by an abrupt east-facing scarp.



UP RED EAGLE VALLEY, FROM RED
EAGLE MOUNTAIN.



SUMMIT OF MT. REYNOLDS.
From photographs by François Matthes.



UP ST. MARY VALLEY, FROM RED
EAGLE MOUNTAIN.



They may be traced under water for some distance, from either shore; and they evidently produce, not only a narrow strait but a shallow one as well. Above this strait, locally known as "The Narrows," the general character of the topography changes altogether; steep talus slopes of coarse, angular material and precipitous cliff bands take the place of the gently inclined, smooth alluvial fans previously noted. The limestone reef is of great interest geologically, being the lowermost member of the Algonkian series; immediately below it is the line of contact of this series with the softer Cretaceous beds over which it has been bodily pushed. This same limestone reef may be found in the Swiftcurrent Valley, which it crosses about a mile above Altyn, at which place it produces the falls of the creek, and dams up McDermot Lake.

Looking across the St. Mary Lake from the top of the limestone ridge, a series of three conspicuous hanging valleys, of varying sizes and altitudes, will be discovered, with U-shaped profiles as clearly cut as if they had been modeled by a physiographer. The first one—the smallest—situated under the summit of Red Eagle Mountain, is, strictly speaking, only a cirque; its floor is more than two thousand feet above the level of the lake.

The next one, dominated by Little Chief Mountain (9541 ft.), is a larger, less shapely cirque, with a steep, uneven floor, crossed by irregular benches, and truncated at a height of fifteen hundred feet above the lake.

The third and largest one is a valley several miles long separating Citadel Mountain (9024 ft.) from Little Chief; its discordance with the main valley is comparatively slight—about eight hundred feet. A beautiful cascade falls from its mouth down the timbered cliffs, to enter the lake through the swamps at its head. Viewed from near the base of Goat Mountain (8816 ft.), on the north side of the lake, the gigantic U-section of this nameless tributary valley, marvellous in its regularity, stands out sharp, like a silhouette, against the faint purples and blues of the distant peaks. The almost faultless symmetry and smoothness of this prodigious curve, extending from the summit of Little Chief to that of Citadel, two miles across, and thirty-five hundred feet deep, are probably unsurpassed within the limits

of the United States. Perhaps, some day, it will be a familiar illustration in our text-books on physiography.

Of a similar character, only broader, deeper, and less strikingly symmetrical, appears the St. Mary Valley itself, for several miles from the head of the lake up. Then it forks, and each of its two branches again splits into several minor radiating tributaries. The latter join the parent valleys with discordances of considerable magnitude; but the two main branches unite with almost perfect accordance. The glaciers which issued from them must have been very nearly evenly matched; yet the south prong appears a little the larger of the two, and has even to-day extensive ice-bodies at its head, while the north prong possesses scarcely any. A comparative study of the members of the St. Mary system (which may be advantageously made on the new topographic atlas sheet recently published by the Geological Survey¹) will be of interest as bearing out in a general way the law regarding the inverse relation between the amount of discordance of a tributary valley and the extent of its glacial drainage area.

The problem of the origin of the discordance of glaciated valleys, and of the eroding power of glaciers in general, may receive additional light from a study of this interesting locality. Special attention should be given to the peculiar terraces, several square miles in extent, situated in the forks of the St. Mary Valley, near Mt. Reynolds (9147 ft.). These terraces should be correlated with the mesa-like features typical of the depression between the two ranges and with the low, sometimes wide gaps in the crest of the Lewis Range. They are most likely representative of an antecedent cycle of denudation, and may be considered as having been preserved from further stream erosion by a blanket of glaciers, while the main valleys were being deepened by the streams of interglacial times. While it is true that these high terraces were subject to glaciation for longer periods than any other portions of the region, their configuration was not favorable to the accumulation of great ice masses and did not allow the latter to organize into well-ordered ice-streams of the alpine type. And as long as this organization was prevented the eroding power of these terrace glaciers

¹ Chief Mountain Quadrangle, Montana.

must have remained insignificant. The glacial shelves which we have described so often are subject to similar reasoning; indeed it seems quite reasonable to suppose that they too were remnants of this older surface. As regards the valleys themselves, there can be no doubt that they were heavily glaciated after they had been deepened by stream erosion. The indications are strong, however, — as may be brought out especially by sections constructed with data from the map — that the transformation of the V-shaped gulches into U-shaped canyons was mainly effected by lateral cutting, and only incidentally through deepening. The U-section in itself implies no preponderance of downward frictional components, while the two curves are strongly indicative of a graded distribution of components along the entire periphery of the section. If we superimpose a U-section upon a V-section, so that the two will coincide at the base, the large amount of lateral cutting necessary to produce the transformation becomes at once apparent. This subject, however, properly belongs in another paper.

Continuing up the trail along the north side of the lake, new forms are beginning to appear. Opposite Citadel Mountain, a cliff-girt, frowning fortress of rock, rises the towering, formidable pile of Going-to-the-Sun (9594 ft.), five thousand feet high above the valley. No true appreciation of the unrelenting precipitousness of its rocky sides, nor of the awe-inspiring majesty of its ensemble can possibly be gained from any point on the valley-floor; nothing short of a climb up Goat Mountain or Red Eagle will do it justice. Unrivalled for its uncompromising boldness and inaccessibility by any peak in this region, the rockiest of our Rockies, it stands haughty and unconquered. the type of the mountain ominous.

A side trip up Baring Creek, under the imposing east wall of Going-to-the-Sun, should not be omitted, if time permits. At the head of its cirque, on a high curving shelf in the shadow of the mountain, lies the Sexton Glacier, from whose half mile of ice front periodic avalanches crash down the precipice with thundering roar. Here, too, in the miniature canyons of turbulent Baring Creek may be found potholes of various sizes, scooped out in the dark red argillite. Perhaps some are still being evolved deep under the foaming surface of this torrent.

Proceeding up the St. Mary Valley, we once more enter the hopeless tangle of underbrush and fallen timber characteristic of the Rockies. An occasional blaze or axemark shows where long ago a lone trapper made his daily rounds. But he walked on snow, well above our heads and all the down-timber, and put his blazes some ten feet above the ground; so his route is one we cannot follow. Treacherous swamps—once picturesque morainal ponds—force us out of our direction; the swift St. Mary River, fordable in but few places, checks us time and again like an efficient barrier. It is a wearisome, meandering march at the best. A rough trail was cut at the time of the survey of this region whereby the author could travel with his pack-train in one day from the cabin at "the Narrows" to the head of the valley; but unless this route has been used and kept open in the succeeding years, it should no longer be considered as extant at all. It would be simpler to cut a new one.

Near the head of the valley a small swampy park affords a convenient camping-place, and here we halt. Above the slender tops of the firs appears a gorgeous spectacle in subdued purplish brown and dazzling white. Outshining all else, superb and reposeful, rises Mt. Jackson (10,023 ft.), and from its eastern flank stretches the great Blackfoot Glacier, a vast mantle of ice enveloping the slopes of the Continental Divide. At its east end, sombre and unadorned, stands Mt. Stimson (9252 ft.), while above the middle of the glacier, surmounting the snowy expanse, appears the dome of Mt. Blackfoot (9597 ft.), mysterious and undefined.

The most satisfactory view of the Blackfoot Glacier and its trio of guardians may be had from the west flank of Citadel Mountain. From here also one looks down into the Gunsight Pass, between Mt. Jackson and Gunsight Mountain, and the idyllic lake below this deep col. Due west lies Fusillade Mountain (8747 ft.), of strangely deceptive form; appearing like a tapering peak when viewed from the St. Mary Lakes; like a rounded, bulging mountain when seen from the south; and like a straight, crested wall when beheld from the north. A hanging valley with foaming cascades, eight hundred feet high, separates it from the next massif to the north, dominated by the

symmetrical pyramid of Mt. Reynolds (9147 ft.). It would be wearying to describe in detail the great variety of interesting forms and scenes at the head of the St. Mary Valley; enough has been pointed out to give the reader an inkling of their unusual grandeur. It would be a mistake, however, to leave the St. Mary Valley without making the ascent of Mt. Blackfoot via the glacier. The total number of parties that have climbed this mountain—so far as our present knowledge extends—may be counted on the fingers of one hand (and then there may be fingers to spare). Yet the difficulties of the climb are not of such a character as should deter a fairly well experienced mountaineer from undertaking the trip. The glacier is not a particularly dangerous one, although its upper portion is badly fissured. It is a treasure for the student of glacial motion, who may find within a relatively small compass examples of the characteristics of both cirque and valley glaciers; typical instances of lateral and longitudinal crevassing—the latter especially at the extreme ends of the two lobes; of ice-cascades over rock terraces, with beautiful exposures of ice-stratification; and last, but not least, of exceptionally fine morainic accretories.

The panorama from the summit of Mt. Blackfoot is easily the grandest of any in these mountains. Surrounded on three sides by dazzling glaciers—some six square miles of ice in all—this peak enjoys a situation wholly unique in our Rockies. But the most glorious, the crowning feature of all, is the huge, seemingly bottomless amphitheatre on its west side, across which lies the Harrison Glacier. Descending three thousand feet in tumultuous ice-cascades from a broad cirque near the summit of Mt. Jackson, this magnificent glacier eclipses all the others we have seen. From its numerous crevassed lobes dozens of foaming torrents dash down over the precipitous cliffs, producing a steady roar in the amphitheatre, broken only by the occasional thunder of falling ice. Here is a scene which dwarfs the Yosemite Valley, and makes the Grand Canyon seem commonplace. One mile deep, and only two miles wide from peak to peak, this enormous canyon-amphitheatre, with its glaciers, waterfalls, and majestic peaks, presents a scene of superlative splendor perhaps unequalled south of the Canadian line.

The foregoing description, penned down rather hastily from recollections dimmed by more recently visited scenes, can scarcely claim to give an adequate picture of a region so remarkably profuse in wonderful details and modelled on such a heroic scale throughout. One might as well attempt to describe the Bernese Oberland in the same space. Nor were these pages designed to do more than make it known that we possess such treasures in Montana. It is not too much to say that neither the Sierras nor even the Cascade Range will bear comparison with these mountains, and that no national park of ours can boast of scenery like theirs. One must go outside of the United States — to the Canadian Rockies — to find types belonging to this category, albeit somewhat higher and more extensively covered with ice.

Enough has been pointed out along the way to emphasize the unusual boldness and magnificence of the glacial sculpturing. A more extended discussion of these features could scarcely be profitably entered into without the aid of a detailed topographic map. Only the principal facts and the problems which they stand for could briefly be indicated.

Thus far, our students of alpine glaciers and their characteristic topographic products have contented themselves with the material available in the high Sierras, the Cascade Range, and the Rockies of Colorado and Wyoming. Comparatively little has been accomplished by them in research on living glaciers, — chiefly for want of conveniently located subjects. After all, most of the contributions to glaciology have come from foreign countries. May it not be hoped that the rediscovery of the Alps of Montana (and they should be rediscovered many times over) will lend new impetus to glacial studies in the United States?

There may be cirques and canyons in other regions, fully as beautiful and fashioned on even grander scales, but, if we limit our search to the compass of our own country, none will be found equal to those of the Lewis and Livingston ranges.



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A Flat-topped Range in the Tian-Shan.

By W. M. DAVIS.

Read February 9, 1904.

DURING the summer of 1903 I had the good fortune, as a member of Professor Raphael Pumpelly's Carnegie Expedition to Turkestan, to see something of the western ranges of the Tian-Shan mountains. Reports by the various members of the expedition are to be published by the Carnegie Institution, but it is appropriate that APPALACHIA should contain a brief account of certain peculiar mountain features that some of us noted. The observations here to be described were made during a special excursion undertaken with Mr. Ellsworth Huntington, Carnegie research assistant, in the neighborhood of Lakes Son-kul and Issik-kul in the month of July; the bearing of the observations will be better understood if they are introduced by a few general considerations.

It must be remembered that during the first half of the last century, mountain peaks and ridges were generally regarded as so many individual upheavals, not greatly modified by the ravining action of streams on their flanks, while the valleys between them were regarded as the original depressions between the upheavals, somewhat changed by the later action of their rivers. It was only during the second half of the nineteenth century that it came to be recognized that the processes of upheaval work in a broad fashion, and that these processes working alone would as a rule produce only large, rounded forms; while the various details of ravine and valley, ridge and spur, peak and pass, are in nearly all cases the product of stream action upon the broadly uplifted masses. Mountains as we see them are therefore to be regarded as the sculpturing work of weather, streams, and rivers on uplifted masses, and not as essentially the result of uplift alone.

After the carving of mountains by the various processes of erosion had come to be generally accepted, a still further extension of the work of these processes was recognized in the last quarter of the past century. If the action of rivers upon a broadly uplifted mass will after a time dissect the mass so as to produce a great variety of mountain and valley forms, the long

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continuation of the processes of weathering and sculpture will at last wear down the peaks and ridges between the valleys, subduing them to rounded hills, and finally producing a rolling plain of low relief close to the level of the sea into which the rivers drain. A worn-down form of this sort has been called a peneplain, that is, an almost-plain; and many examples of worn-down surfaces of this origin have been recognized in different parts of the world. Thus the whole cycle of changes in the life-history of a mountain range has been brought within our understanding, from the simple crudity of youthful upheaval, through the elaborate variety of mature dissection, to the worn-out monotony of penultimate extinction.

Curiously enough, it is the simple uncarved mountain forms of early youth that are least known. There are abundant examples of mountain ranges in the stage of vigorous maturity; there is no scarcity of mountains in the subdued or nearly extinguished forms of advancing age; but young mountains, on which the processes of carving have as yet worked so little while as to leave a considerable share of the uplifted surface uncarved, hardly modified from the shape due to deformation, are rare. It is for this reason that the student of systematic physiography attaches so great a value to those occasional examples of young mountains, inconspicuous as to height and little varied as to form, which seem to be chiefly the result of warping or breaking the earth's crust, — the simplest instances of this kind being those observed by Russell in southern Oregon, and described by him in the Fourth Annual Report of the United States Geological Survey; yet even these low ranges have been a good deal carved, as far as I have seen them. It is probably then by reason of the rarity of young mountains, that little attention is given in modern text-books to the original form of the upheaved mass in which the mountains are to be carved. Moreover, it is generally a difficult problem to reconstruct, even in the imagination, the earlier forms from which the sculpturing processes have carved vigorous, mature mountain ranges; hence young mountains receive scanty attention. It is because some of the Tian-Shan ranges offer an easier solution than is usual for this problem, and a better illustration of young mountain form than is often found, that attention is here called to them.

As our small party was travelling down the valley of the Alabugas river, a branch of the Narin in the western Tian-Shan, we saw, some forty or fifty miles to the northwest of us and in the direction of the high basin of Lake Son-kul, a flat-crested mountain range whose plateau-like uplands were covered with snow. The distance was at first too great for us to make out the structure of the range, but inasmuch as its top was nearly level, we were led to suppose that it must be composed of horizontal strata, and that it was of plateau-like structure as well as of plateau-like form; a less disturbed part in a greatly disturbed region, for elsewhere we had seen that the structure of the mountains was seriously disordered. The range was then lost to sight as we entered a side valley north of the Narin after crossing that river, and was not seen again until we reached the east end of Lake Son-kul. There, while making an afternoon ascent to a glaciated trough among the mountains northeast of the lake, we had again a fine view of the flat-topped range, now seen from the northern side instead of from the southeast



as before. It was then identified upon the Russian 40-verst map as the Boural-bas-tau; we were able with the aid of our field-glasses to recognize that the range was not composed of horizontal stratified rocks, but of massive crystallines, perhaps granites, like the rocks upon which we were standing. The plateau-like top of the range had an altitude of twelve or thirteen thousand feet. It was again seen to be remarkably even, smoothly coated over with a great snow-field. The northern side of the range was deeply carved with valleys, in whose cirques we saw the manifest signs of former glacial action. Similar valleys probably indent the southern side. In one or two cases the heads of opposing valleys on the north and south happened to come together; there the plateau top was consumed and its place was taken by a narrow, sharp-crested ridge, a little lower than

the rest of the plateau. The plateau spurs between the north-opening valleys exhibited various stages of dissection, sometimes showing a continuation of the flat top of the plateau, gently sloping northward between their steep walls, sometimes having been so far consumed as to have exchanged the flat



top for a sharp-crested ridge or *arête*. It was evident that the plateau once extended somewhat further north, and it is probable that it formerly had a somewhat greater extension to the south; its reconstructed surface would have an area of at least one or two hundred square miles.

There can be no question that the plateau-like top of the Boral-bas-tau is really part of an ancient peneplain, now uplifted to a height of many thousand feet and undergoing the early stages of a very vigorous dissection. Hence we have one of those rare examples in which the form of a range in a very early stage of its present cycle of erosion can be clearly seen. In this respect, it is one of the most satisfactory examples of a lofty young mountain range known to me. The noteworthy features of the range are, first, the perfection of its peneplanation in the former cycle of erosion, when the surface that is now seen in the flat top of the range was standing at a comparatively low level, probably eight or ten thousand feet lower than to-day; and second, the remarkably good preservation of a significant part of the peneplain in spite of elevation to its present commanding height. There are, elsewhere in the world, many examples of peneplains as well finished as this one, but nowhere else do I know of a well-finished peneplain so evenly uplifted and so distinctly recognizable at as great a height as that which crowns the Boral-bas-tau.

In view of the activity with which erosion is now dissecting the uplifted mass, it is to be inferred that its elevation must have been both rapid and recent. Had it been uplifted slowly from its former lowly estate, the processes of dissection would have cut it to pieces even while it was rising. Had it been uplifted long ago, the processes of erosion would have since then cut it to pieces, however rapidly it had been raised. From the

evidence of form alone, we are thus led to the same conclusion that has been announced from the evidence of disturbed Tertiary strata in the Tian-Shan; however ancient many of its rocks may be, it is a new-made mountain system, or better said, it is a newly re-made mountain system.

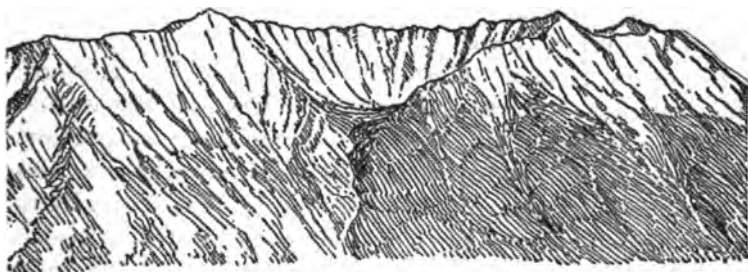
The east and west extension of the Boural-bas-tau has a peculiar significance; the plateau top of the range dips slowly to the east and seemingly descends towards the valley of a northern branch of the Narin, while to the west it rises very gradually and is more and more encroached upon by valleys on the north and south. Its length may be about thirty miles. In following it westward the plateau top becomes narrower and more irregular; then parts of it are isolated by gnawing valley-heads; the isolated parts become smaller, and at last disappear; but the range continues for a score or more of miles still farther to the west, south of the Son-kul basin, under the name of Mulda-ashu. Here, however, the mountain tops are of ordinary ridge or peak form and of sub-equal altitude; no trace of plateau is to be seen. Yet one can hardly doubt that the western peaks and ridges are nothing but a later stage in the dissection of the plateau than that seen in the eastern part of the range, where the plateau is still in good share preserved. Here one has, therefore, and on a large scale, an actual example of what has often been inferred on theoretical grounds, — that is, a sub-equality in the height of mountain peaks due to the dissection of a once even upland in which the valleys between the peaks have been carved; and this explanation of the accordance in the height of mountain peaks may therefore be fairly added to the other explanations that are now current. It certainly seems to be applicable to the western, serrate Mulda-ashu, and it may be equally applicable to other ranges.

The eastern slopes of the Cévennes in southeastern France offer an example of this kind on a comparatively small scale, where summit altitudes are not more than three or four thousand feet above sea level; but nowhere have I seen so lofty an example of the kind as the Boural-bas-tau affords. It was with regret that we had to turn away from this interesting example of mountain form, and cross a pass north of Son-kul to the deep valley of the Toluk, a branch of the Chu river system. The plateau

range sank out of sight, not to be seen again. I commend it most warmly to students of mountain morphology as an example for special study. It is accessible without difficulty, and its exploration would be made easy by aid from the nomadic Kirghis, who camp in the summer on the rich pastures around Lake Son-kul, at altitudes of nine thousand feet or more. While classified as barbarians, they are a hospitable folk, who welcome the traveller in the most cordial manner. They were given a rather bad name by some of the Russians in Turkestan, who describe them as lying and thieving; but our experience with them last summer gave little support to such a characterization. They did not prove to be accurate in the estimation of distances, being over-hopeful; they did not prove to be trustworthy guides in a certain mountain pass, being over-deferential and apparently unwilling to say that what would be impossible to them would be difficult for us; but they gave us of their best in their summer camps, and we had to be no more careful of our possessions than we should have to be in a Western mining settlement.

Another matter of interest to mountain climbers may find mention here. The normal processes of mountain carving by rain and rivers, above referred to, need to be supplemented in certain cases by glacial erosion. We saw a number of examples last summer in which the contrasted results of river and glacial erosion in mountain ranges were easily distinguishable. In those maturely carved ranges where there was no sign of glacial action, the slope of the streams increased with much regularity to their very heads; even above the points where running streams were seen, the down-slope lines of the mountain sides continued to increase in steepness up to the ridges and peaks, except for a slight rounding off in the uppermost parts. The systematic simplicity of these forms was very noticeable. The variety that they possessed was not the result of irregular variation of slope so much as it was the result of repeated division and subdivision of the valley lines, far up toward the mountain tops. In contrast to this normal simplicity of down-slope line, a number of examples were seen where the slope lines were not of continually increasing steepness to their heads, but exhibited a bench-like decrease of slope at a height of ten or eleven thousand feet, above this again increasing in somewhat normal fashion to the

peaked mountain tops. The gently sloping or hollowed bench is the floor of the valley-head cirque, and the higher, steeper slopes are the walls of its amphitheatre. In all cases that we were able to examine, the valleys whose cirques thus showed a local decrease of slope had formerly been occupied by glaciers, the presence of which was well attested by moraines at about the point where the decrease of slope began. This example of a departure from the forms of normal erosion seems worthy of being placed on record, because it so fully confirms the generalizations set forth by Johnson for our western Cordilleras, by



Richter for the Alps, and by de Martonne for the Carpathians within the last ten years. To my surprise, the cirques of glacial origin were recognizable to the naked eye at distances of ten or twenty miles, and with field-glasses at distances two or three times as great. Moreover, it often happened that the retrogressive erosion in adjacent cirques had so strongly undercut the dividing ridges and spurs as to reduce them to sharply serrated *arêtes* of characteristic Alpine form, the sharp *arêtes* as well as the large-headed cirques being recognizable many miles away because they gave the mountains a different expression from that assumed where normal weather-and-water erosion had acted alone. The *arêtes*, however, are not essential; they only mark a certain stage in the process of the erosion of high mountains by glaciers. Before adjacent cirques are so far gnawed back as to narrow and sharpen the mountain walls between them, the walls may be flat-topped, as in the Boral-bastau, or in the Big-Horn range, as described by Matthes. And afterwards, the retrogressive erosion of the cirques may be so far advanced that the *arêtes* are greatly reduced in height and sharpness, as seems to be the case in the Sierra Nevada, where some

excellent examples of this kind are lately described by Lawson. Until a few years ago, I should have been very skeptical on these points. It had until then seemed to me doubtful that glacial erosion had taken so large a part in the general process of mountain sculpture; but the evidence brought forward by Johnson, Richter, and others has changed my views on that point. The large size of the valley-head cirques produced by glacial action is so well contrasted with the smaller dimensions of valley-heads due to normal erosion that the two need not be confused, and it seems safe to say that glaciated valleys may be distinguished from valleys of normal erosion over the great distances above mentioned.

In the report to the Carnegie Institution by Mr. Ellsworth Huntington, who turned southwest from Issik-kul and crossed several of the Tian-Shan ranges to Kashgar in the western part of Chinese Turkestan, the reader may find many more examples of flat-topped mountains of the kind here described. Mr. Huntington came to the conclusion that not only the Boural-bas-tau was an uplifted and somewhat dissected peneplain, but that a great part of the Tian-Shan mountain system where he traversed it might be so described. In certain districts the higher summits seemed to be re-sharpened forms that had been low and rounded residuals or "subdued mountains" on the once low-lying peneplain; elsewhere the slightly dissected highlands of the plateau-like mountain mass fully confirmed the expectation aroused by the comparatively small plateau-top of the Boural-bas-tau. The Kirghis recognize the plateau-like highlands, which they call the Syrt. This mountain range is, therefore, not by any means to-day in its first cycle of erosion, but is clearly in a second cycle succeeding a far advanced earlier cycle. In spite of its general height of ten or twelve thousand feet, with summits rising several thousand feet higher still, it preserves broadly even or gently rolling uplands of considerable areas, not yet dissected by its revived and encroaching rivers. Mountain-climbers whose ambition demands dizzy peaks would find the Tian-Shan rather tame, though some of its re-sharpened summits might please them for a time; but for the lover of mountains whose taste for climbing is combined with what may be called physiographic antiquarianism the Tian-Shan has many attractions.

The Conquest of Mount Goodsir.

BY CHARLES E. FAY.

IN his interesting article on "The Ottertail Group," which opens the present volume of APPALACHIA, the Rev. Mr. Outram described our forcing of a new entrance into the secluded Ice River valley over the forbidding ice-fringed wall that frowns upon the broader valley of the Ottertail Creek, with the first ascent of Mt. Vaux (11,000 feet) as an episode on the way. This he followed with a vivid account of our subsequent assault on the highest peak of Mt. Goodsir, the monarch of the Canadian Alps that lie south of the railway, as Mt. Columbia is of those to the northward. That attempt failed, it will be remembered, at a paltry hundred feet or thereabout below the summit, owing to a dangerous "reversed cornice" capping the narrow arête, the second element of which, hanging westerly, would have forced the party upon steep snow lying towards the sun and already in avalanching condition. With but a single guide to a party of three, it was thought unwise to try to negotiate it, and were turned to camp discomfited. But in mountaineering (would that more would remember it!) "he who fights and runs away may live to fight (and perhaps win!) another day."

To such as read Mr. Outram's article, and particularly to those who recall Mr. Scattergood's story of his trip to Mt. Molison, with the serious obstacles to his advance offered by three powerful streams—the Kicking Horse, Beaverfoot, and Ice River—and by a trail none too good, losing him here and there in direful morasses, it may sound incredible when I report that our party left Leancoil at one o'clock on July 12 of last summer and five hours later we were encamping well within the Ice River valley, perhaps two miles below the location of our camp of 1901; but so it was, thanks to the aid the Dominion Government is affording to the mining interest in those regions, it having already built an excellent wagon road some twelve miles up the Beaverfoot valley. This road begins with a series of bridges over the scattered but still formidable strands of the turbulent Kicking Horse River at Leancoil, which had forced us to conclude our week's campaign of 1901 with the toilsome tramp,

that Mr. Outram tells of, for eight miles amid varied perversities along the river's southerly bank.

Just beyond the last of these bridges two stalwart young Ontarians, the brothers Nixon, have built a shack and stable, and hold themselves prepared to pack for miners, prospectors, hunters, or mountain climbers into the regions approached by the new highway. Our experience proved them most competent, reliable, and amiable men. One of them, mounted on his spirited gray and driving before him a well laden pack animal, formed the mounted escort of our aspirants for Goodsir — Professor H. C. Parker and myself, with guides Christian Kaufmann and my old friend Häsler. The fair day lent Mercury's wings to our feet, and we sped swiftly along the clayey road that skirts the base of Chancellor Ridge, over whose accidented crest our party had taken the trip in reverse two years before. The end of the unfinished road was reached at an excellent new cabin just before the crossing of the Ice River ; but from here on, the Ice River trail has been so improved by the miners who are preparing to operate in the side gulches of that valley, that we did not miss the excellent footing of the highway. The only notable episode of our quick passage along it was the starting up of a black bear, that dashed across the torrent by stranded tree-trunks and up the steep bank beyond, to the whistling of shots that probably failed to find him.

Our over-night camp in sight of the great peak was a delightful one. The sweetest of trout from the clear pools near by gave a zest to our meals there, and indeed the overplus went higher to our more permanent camp in Zinc Gulch. Our only concern was caused by the sight of so much snow upon Goodsir, — snow that had fallen some three weeks before, defeating Parker's earlier attempt to win the summit, after attaining to an altitude of nearly ten thousand feet — hard luck for him, but, as it proved, great good fortune for me, and so, vicariously, for our entire party of 1901. That snowstorm evidently knew what poetic justice demanded, and my kind friend Parker never took issue with it, but even said he was glad it came ; but now to see so much of its dispensation hanging ominously on the precipitous slopes, made it seem for the moment as though it were in league with the yet unconquered mountain.

Zinc Gulch opens into the main valley perhaps a mile and a half north of this first camp, and heads at the ridge connecting the southernmost and lowest of the three peaks of Goodsir with the range that forms the western bound of the valley of Moose River, the next tributary to the Beaverfoot south of Ice River. An excellent trail climbs some three thousand feet from that camp to our second one, at an altitude of nearly seven thousand feet, just above which is found the strike of ore that lends its name to the gulch. The altitude is about that of the bivouac of 1901 from which we had started to do Goodsir; but it is a much finer situation for a camp, and particularly for an extended sojourn.

Starting from our lower camp late in the forenoon of the 13th, with beautiful, promising weather, though somewhat hot, we came suddenly about noon into uncomfortably changed conditions, — chill wind and snow squalls, amid which we set up our tent, and we were soon glad to seek warmth under our blankets. An afternoon of uncertain conditions grew more promising by nightfall, and we retired quite hopeful of the morrow. At two o'clock we heard Kaufmann stirring, then saw him rise and peer out into the chilly air. To our question as to what he saw, he replied, "It is snowing hard" — the seeming doom of this third attempt. Morning revealed Christmas conditions in Zinc Gulch, the young evergreens bearing each a fluffy freight of snow.

Now came the hour for a decision. Professor Parker, whose expedition it really was, was booked to start in a couple of days with a party for a trip to the Saskatchewan; consequently few supplies had been brought in with us. The lateness of the season and the previous prolonged period of bad weather had warranted every hope of settled conditions, long enough at least for a quick dash for the peak. It lay with him to decide, and the mountaineer's instinct won. It was in his case probably now or never for Goodsir, and ways could be devised for overtaking the Saskatchewan party. Nixon was instructed to ride out to Leanchoil and bring in supplies enough for several days. A siege was to be laid. It was foul weather against sun-heat and our persistency. Soon after the hoofbeats of Nixon's gray died away down the trail, the weather improved enough to permit

investigation of the immediate surroundings, though the great peak towering just over us remained shrouded in clouds most of the day.

The 15th, however, dawned bright, and, to our delight, warm. Only high-sailing clouds toyed with the topmost summit, while the full sunlight lay meltingly upon the newly fallen and yet older snow upon the cliffy sides. The exquisite weather tempted us upward, and we occupied the forenoon with an ascent to the high pass dividing us from the Moose River valley. Only the husbanding of our strength for the main peak prevented our taking in the third summit, "Little Goodsir," which is easily accessible from this crest. We did not complain of the heat that made us perspire most freely in our return to camp. It was our best friend. We knew that every lightly coated rock on Goodsir's hither side was sending its tribute of invisible moisture to the upper air.

Before three o'clock of the 16th we responded with alacrity to Häler's call. The dawning day was superb. The moon, sailing serenely above the cliffs hemming our gulch on the south, looked down on our hasty but plentiful breakfast, and witnessed our departure (at 3.40) in high spirits from the camp. Falling soon into a slow and steady pace, we crossed a reach of fallen timber and began the lower slopes of lawn and screes, making no pause for a moment until one of perhaps five minutes at the first steep rocks to put on the rope. Happily the rocks were not icy, and the snow was in perfect condition whenever we took to it to skirt along some unpromising expanse of rock. We kept, therefore, our steady pace until eight o'clock, when at nearly ten thousand feet we paused for our second breakfast. And amid what grandeur! The western horizon teemed with the numberless dazzling snow peaks of the Selkirks; nearer at hand to the southeast sprang Helmet Mountain, and beyond it the great snow field of Washmawapta glacier, while towering out of the morning cumuli, the distinctive figure of Mt. Assiniboine, so lately conquered, gazed at intervals through the veil in sympathy toward the doom of yet mightier Goodsir.

Our route had joined that of 1901 considerably below our lunching place. From here on, even to the top of the seemingly vertical cliff at whose upper edge we had turned back in dismay,



MT. VAUX AND NORTH TOWER OF MT. GOODSIR.



THIRD PEAK OF MT. GOODSIR AND HELMET MT.
From photographs (at 10,000 ft.) by H. C. Parker.



CLIFF BELOW SUMMIT OF MT. GOODSIR (1901).

SUMMIT SEEN FROM TOP OF THE CLIFF (1903).

From photographs by J. H. Scattergood and C. E. Fay.

our ascent was little other than a repetition of that former one, — save that the snow was in far better condition, remaining firm and crisp to the very summit. Arrived at our previous altitude, we found the situation on the summit arête entirely changed, the remarkable “reversed cornice” having entirely disappeared, — not wholly to our satisfaction, however, for I had always regretted not having secured on that occasion a photograph of so rare a phenomenon, and inasmuch as we had come prepared with two excellent guides to knock the cornice off, or for whatever else might be necessary to overcome this last defence of the unconquered summit.

The distance from the top of the cliff to the summit is perhaps five hundred feet, with an ascent of one hundred and fifty feet at the most. So near had we once already been to victory! But it is indeed a most interesting bit. On the left (westward) for much of the distance it falls vertically, perhaps even slightly overhanging a tremendous descent, so that anything let drop might go a thousand feet before striking, and then would ricochet three or four thousand more before coming to a state of rest; on the right, a snow slope of at least fifty degrees descends for perhaps two thousand feet, ending at a precipitous fall of doubtless three or four additional thousands. On the knife-edge in which these slopes met I saw one of the party astride at a certain point with one leg pretty nearly vertical and the other at no uncomfortable angle from its mate.

At eleven o'clock we stood upon the summit — the highest in the Rockies of British Columbia; first, a broad expanse of snow slightly tipped westward and northward, and perhaps fifteen feet in breadth — but of this a full third is cornice, overhanging towards the Ottertail valley; this small plateau is prolonged in a narrower extension a hundred feet or more, ending in a gable that we did not think it worth while to look over. It is corniced all the way. No later comer will find a “stone-man” on Goodsir’s summit; there are no stones, — nothing but pure white snow.

For the view, one word only must suffice — it is magnificent! Unlike many culminating summits of a region, it did not belittle all the rest, for many of those nearest it in altitude, — Temple, Hungabee, Deltaform, Assiniboine, — were sufficiently

far away and striking enough in architecture to preserve their eminent individuality. Only Goodsir's own ponderous north peak, or rather tower, and the rounded dome of Mt. Vaux and the nearby Chancellor, all far below us, lost much of their prestige in this bird's-eye view. It was indeed a great surprise to see how long before reaching our summit we were looking over the "scalp" of the north tower; yet in many views it would pass for the peer of its loftier mate. To the right of it the lowest point of our prospect was visible, — the valley of the Kicking Horse, fully eight thousand feet below us.

Professor Parker soon had his thermometer boiling, — it only had to reach 190.9° , corresponding to a barometric reading of 19.39 inches. Our figures, combined with readings for the day taken at the Government station at Banff, furnish an altitude of 11,925 feet, perhaps the most accurate barometric result obtained for any of the Canadian peaks thus far measured.

An hour was spent in these observations, in photographing, partaking of our noon meal and enjoying the grandeur; then we began our descent. The great cliff took some time to negotiate, as it had done on our way up. It is the one fairly difficult thing of the ascent. Passing over the snowy shoulder just below it, we diverged from our upward route, breaking down steeply on the right to the great snow couloir, which here sweeps downward with a great curve to the left and ends at an altitude but little higher than that of our camp. By this time the sun had succeeded in softening its surface, and we sank in to our knees or even deeper; therefore our progress was not rapid. Its lower portion was no longer smooth, as the upper part had been rendered by the most recent snow-fall, but lay in rough, tumultuous furrows from the avalanching of that earlier one. We were some three hours in reaching its foot, from which, turning to the left and following approximately a contour, we swung around into Zinc Gulch. At six o'clock we were again in camp, greeted, as we approached, by Nixon, who had just returned with a liberal store of supplies. A few moments later a plunge in a clear pool of the mountain torrent at a temperature of possibly 40° Fahrenheit laved away every memory of anything toilsome in the finest ascent that it was ever my privilege to make.

First Ascents of Mts. Hungabee, Deltaform, and Biddle.

BY HERSCHEL C. PARKER.

Read February 18, 1904.

AFTER the "Conquest of Mt. Goodsir" with my friend Professor Fay, a most interesting and memorable expedition, I journeyed to Lake Louise. It was my intention to join a party of friends who had just left on a camping and exploring expedition up the Saskatchewan, but finding that they must send back to Laggan for supplies and that I could overtake them about two weeks later, I was persuaded by Christian Kaufmann, who had guided us so successfully on Goodsir, and his brother Hans, to make an attack on Mt. Hungabee.

On the morning of July 20, with a week's provisions, silk tent, and mountaineering equipment, we made a rather late start from Lake Louise. A pack-horse carried most of our "impedimenta" as far as Moraine Lake. Here, assuming the heaviest of packs, we proceeded slowly up the Valley of the Ten Peaks and, crossing the high pass between Neptuak and Hungabee, made a rapid descent to Prospector's Valley, where we arrived in good time to make camp.

Leaving camp next morning at 3.50, we made our way up Prospector's Valley to within about a quarter of a mile of the Opabin Pass, whence, taking to an arête, we had a fairly easy and interesting climb of possibly two thousand feet. At this point farther progress was barred by a wall of vertical cliffs. Directly in our path this rocky battlement was broken by a narrow icy couloir and a much narrower chimney filled with ice. After inspecting the couloir, Christian decided that the chimney would be the safer means of ascent, and so, after seeing that Hans and I were in as secure positions as the circumstances would admit, and with directions not to move from our places close against the rock, he disappeared around an angle and commenced the perilous climb.

It was only by watching the rope that Hans and I could judge the progress Christian was making above us. For minutes at a time, it seemed, the rope would be motionless, then inch by inch it would slowly disappear up the chimney, and the crash of

falling rocks and ice would warn us that we must cling even more closely and find what protection we could beneath the rocky wall.

At last Christian gave the signal that I was to follow, first cautioning me most earnestly not to knock any rocks down on his brother Hans, for a slight mishap to any member of the party in a position like ours might mean a catastrophe for all. A short space of breathless effort, a strong pull on the rope from Christian, and I stood by his side at the top of the chimney. Then, slowly and carefully, Hans made his way up and joined us.

Above us we could see a smooth steep slope leading to the final summit arête. This slope consisted of snow covering treacherous rock, but, thus early in the morning and while in shadow, it was in fine condition, and we made our way easily to the great shoulder of the mountain just under the final peak and almost overhanging Paradise Valley. On this shoulder a second breakfast was eaten, and we anxiously studied the route that we must follow. The summit was only a few hundred feet above us, but the arête, broken by vertical cliffs at this point, was impossible to scale. We had only one alternative left, to make an exciting traverse over a tremendously steep snow slope at the base of these cliffs and so reach the final cone.

We did not discuss the possible dangers of such a course, but cautiously made our way beneath the cliffs, turned a most sensational corner almost in mid-air above Paradise Valley, and then scaled a nearly perpendicular cliff by means of a convenient crack. We were now on the arête and but a very short distance from the summit. Only one more difficulty confronted us: a narrow "gabel," or break in the arête, only a few feet in width, it is true, but with a nearly sheer descent of thousands of feet on either side. This gabel must be crossed to reach the summit. The arête was far too narrow to allow a jump being made with safety; so, slowly and carefully, while firmly grasping the rock on one side, Christian thrust his feet forward until they touched the other and his body bridged the chasm; then a strong forward swing and he stood safely beyond the gap. For me, aided by the rope, the matter was far less difficult, and soon we made our way over the intervening arête, gained the corniced summit, and Hungabee, the grim old "Chieftain," at last was conquered.



SUMMIT OF MT. HUNGABEE.

From a photograph by H. C. Parker.



MTS. BIDDLE, DELTAFORM, AND HUNGABEE.

From photographs by H. C. Parker.

It was now 10.40 A. M., almost exactly seven hours since we left camp, and Christian warned us that we should not stay long, on account of the dangerous snow slopes we must cross on our return. Hans wished me, however, to determine the altitude by means of the hypsometer, so I "boiled a thermometer," a proceeding which, on account of the high wind, consumed some time, so that it was nearly an hour later when we were finally ready to start downward. We reached the point where we had halted for breakfast, without difficulty, but from here down the hot sun beating on the snow was fast changing it to the consistency of slush, which threatened to avalanche at any moment. We crossed this safely, however, and arrived at the rocky shoulder just above the chimney. It seemed to me hardly more than three minutes after we had left the snow slope before a portion of it, including almost our very footsteps, slid downward and disappeared over the cliffs below us.

The descent of the chimney was not an inviting proposition, for the condition had entirely changed since morning and it was now spouting water. We did not hesitate long, but descended as rapidly as possible and soon emerged at the other end, somewhat wet but very happy, for now our difficulties were at an end. From here the way was comparatively easy, and camp was reached about six o'clock, after a most entertaining and glorious day.

The following morning we reconnoitred Mts. Biddle and Deltaform, but could discover no practical route of ascent for either one from Prospector's Valley; so in the afternoon we climbed the steep pass leading to the Valley of the Ten Peaks, and camped that night at Moraine Lake.

The next day the weather proved threatening, but making a late start we climbed Mt. Temple, and returned early in the afternoon during a heavy thunder-storm.

From Mt. Temple we thought we had discovered a route, by climbing the couloir between peaks Four and Five of the Ten Peaks, that would take us to the eastern arête of Mt. Deltaform, and so bring us to the final summit cliffs. These last cliffs, however, looked impossible, and it now seemed to us that we had seen the summit from every side. In our saturated condition another night in camp did not seem desirable; so after

refreshing ourselves with hot tea and bacon, the heavy packs were once more shouldered, and through mud and showers we tramped the ten miles to Lake Louise.

After a very interesting trip to the headwaters of the North Fork of the Saskatchewan, I returned some weeks later to Laggan and learned that neither Mt. Deltaform nor Mt. Biddle had yet been climbed.

On the afternoon of August 28, in company with one of my friends on the Saskatchewan trip, Dr. A. Eggers, a most expert alpinist and delightful companion, and with Christian and Hans Kaufmann, I again started for Moraine Lake and camped about a mile above its head, at the foot of the couloir previously referred to. The next day turned out rainy, so nothing could be accomplished; but on the following morning we got away from camp about six o'clock, and climbing by couloir and arête gained the crest of the ridge between peaks Four and Five, and thence traversing behind peaks Five, Six, and Seven, at last came in sight of Deltaform and the eastern arête which we had planned to climb.

But great indeed was our disappointment when we found that between us and the arête was a deep ravine, and noted that the arête itself was broken by the most formidable of gendarmes. In fact, this side of the mountain appeared more inaccessible than any that we had yet seen. It seemed at last as if the impossibility of reaching the summit of Deltaform had been finally demonstrated; but Christian asserted positively that every peak in Switzerland could be climbed, and such must be the case with Deltaform. We observed, however, that the south-east arête offered a possible route to the summit, if once the top of this arête could be gained. On our previous visit to Prospector's Valley, no way to reach the crest of this arête could be discovered; so it was decided that we must descend to the base of Deltaform¹ and make the complete circuit of the mountain, in order to determine positively if there were not some possible route of attack.

We descended over unstable scree slopes, reached a snow-field

¹ On this side of the mountain, located in a branch valley some hundreds of feet above Prospector's Valley, we discovered a small lake, perhaps a half mile long, for which I would suggest the name of Kaufmann Lake.

and glissaded downward until we came to the head of a glacier, when another unpleasant surprise awaited us. The glacier, instead of descending to the valley at a moderate angle, terminated in a hanging glacier, or vertical curtain of ice, flanked on either hand by perpendicular cliffs. To retrace our steps meant much hard work and great loss of time; to reach the valley from this point looked well nigh impossible. A careful inspection of the cliffs, however, showed that a descent might be effected by means of a series of short ledges, a sort of "giant's stairway," close to the icy curtain. So with great care we climbed down this uncertain route, keeping well in the shelter of the ledges, for the afternoon sun loosened showers of rocks from the mountain wall above, which shot over us just above our heads with a most unpleasant "whiz." At last we came to a space where we were compelled to leave the shelter of the ledges and cross directly in the path of the falling rocks. With all possible haste and many apprehensive glances upward, we made the dangerous crossing and safely reached the other side, for luckily for us no rocks fell during this time. We now soon reached the moraine at the foot of the glacier, and taking off the rope, made our way, well above Kaufmann Lake, around the shoulder of Deltaform and entered Prospector's Valley. Soon we were rewarded for all our trouble by discovering what appeared to be a very promising route from the valley to the top of the southeast arête. On our other visit we had not descended Prospector's Valley far enough to observe this line of attack, and so had considered the mountain impossible from this side.

Darkness descended upon us while making the wearisome climb of Prospector's Pass, and later, rain added to our difficulties. It was half past twelve that night when we finally arrived at camp, after more than eighteen hours of the hardest sort of work. We had made the circuit of five of the Ten Peaks.

Next afternoon we moved our camp over into Prospector's Valley, locating in a most beautiful spot at the foot of Neptuak.

On the morning of September 1, in fine, clear weather, we left camp about six o'clock and, skirting the base of Neptuak, made our way over the lower slopes of Deltaform to the foot of the couloir by means of which we had determined to commence the attack. Sometimes by means of couloir, but more often by

means of treacherous rock slopes, we made our way steadily upward, and at last, emerging through a chimney, found ourselves on the crest of the southeast arête, and the summit apparently within our grasp but a few hundred feet above us. At this point we partook of a second breakfast, and then for a considerable distance made rapid progress until our way was barred by a great rocky buttress. Its walls were too vertical to climb, so we were compelled to make a traverse along its base, trusting to insecure holds on the rock, and with a nearly sheer fall of thousands of feet below us.

This difficulty passed, even worse conditions were encountered just beyond. The rock gave place to solid ice, so hard and flint-like that an ordinary blow from an ice-axe seemed to make but slight impression upon it. But Christian, balancing in his steps, swung his axe with mighty strokes, and, sending the ice in showers of flying splinters down the slopes, hewed safe foot-holds. We kept close against the rocky wall and, turning a corner, made up a couloir to a rocky shelf above us. All this time, while Christian was cutting steps, we clung by most uncertain holds on rock or ice, chilled and numbed by a piercing wind. The shelf was covered by loose rock, and it required the utmost care not to send this flying down upon the companion directly beneath. From the shelf we crossed a couloir of solid ice, where Christian cut hand-holds as well as foot-holds, — for here our axes were of no avail as a means of securing a hold, and a slip by any one of us might have carried the whole party from such precarious footing. Having crossed the couloir, we clambered through a narrow chimney and came out just below the summit cliffs. Here we met with a most trying slope of rock and ice, offering no holds that could be trusted.

In one place, where Christian was only some four or five feet above me, he would not take another step either in advance or retreat, so great were the chances of a slip. Then Hans, with the utmost caution, slowly worked his way past me and with great care helped Christian down to a more secure position.

Another attempt, and we scaled the icy slope, coming upon a splendid cornice leading directly to the sheer pinnacle of rock forming the summit. To me this final rocky spire looked inaccessible ; but without a moment's hesitation Christian led



PEAK "SEVEN," DELTAFORM, AND NEPTUAK.

From a photograph by W. D. Wilcox.

us across the cornice and, saying our work was over, clambered up a narrow chimney I had failed to note, and presently we stood triumphant upon the utmost summit. Deltaform, the impossible, was vanquished.

The summit of Deltaform culminates in two great pinnacles of rock ; the higher is the eastern one, on which we stood ; the other terminates the western arête leading up from Neptuak. This latter crag is perhaps twenty or thirty feet lower than the main summit, and separated from it by a deep gabel, possibly fifty feet in width. It is therefore evident that, even if the ascent could be made so far by the western arête, which is doubtful, the final summit could not be attained.

Although we had thus been successful in conquering what is doubtless one of the most difficult mountains on the American continent, no word of mutual congratulation was spoken. Our position was far too serious to permit of any feeling of exultation. We had no sooner reached the summit than Christian said : " We must not stay here ; we must get down." It had required ten hours to make the climb from our camp some four thousand feet below, and it was now four o'clock in the afternoon. It must have taken nearly four hours to make the final climb from the foot of the buttress, possibly a vertical distance of three hundred feet. At this season the days have already grown short, and we had but a few hours more of daylight left. We did, however, remain long enough to build a " stone-man " and do some rapid photography. Then, at 4.25, we commenced the descent. If the climb had been difficult, the descent was decidedly worse ; but somehow, after a space of what seemed like hours of almost imperceptible progress, we gained the foot of the buttress without a slip or mishap of any kind.

The weather had been rapidly growing worse, and now on the arête we were enveloped in a driving snow-storm. We reached the halting-place of the morning and commenced our descent through the chimney as the gloom of evening fell upon us. Then we plunged downward over treacherous rock slope, difficult cliff, and dubious couloir, in the semi-darkness. At times the moon appeared through the drifting clouds long enough to reveal the depths below, and then once more the veil would intervene.

About two o'clock in the morning we rested on the rim of the last couloir, and as we waited heard the dull crash of a rock avalanche just beneath us. It was past three o'clock when we finally arrived at camp, after twenty-one hours of almost continuous work. The descent had taken eleven hours.

It is needless to say that a great part of the day on which we returned to camp, September 2, was spent in rest.

On the following morning, September 3, we again got away from camp at six o'clock, and, climbing the great wall of cliffs of Mt. Biddle that forms the western side of Prospector's Valley, descended nearly to timber line. After crossing many ridges, we finally arrived at a point beneath the peak near the head of the valley of Mescoh Creek, at about ten o'clock. On account of the amount of ice on the rocky slope above us, which threatened showers of falling rock later on from the effect of the sun, we again climbed to the crest of the south arête. Here we enjoyed some most sensational rock-work, for the arête narrowed to a very knife-edge and fairly overhung the vast depths of Prospector's Valley. The climbing was neither difficult nor dangerous, however, and Dr. Eggers indulged in some very successful photography. After a time the arête ended abruptly in an almost vertical face of rock, but, as usual, Christian discovered a practicable route to surmount this obstacle, and, climbing through a most picturesque "window" of rock, we came out just below the final summit cliffs. These cliffs, while not high, were unscalable from this side; so we made an easy traverse over a slope of rock and snow, and gained the northern side of the mountain just under the summit.

This face of the peak, which here towers majestically over Lake McArthur, is extraordinarily steep for the last few hundred feet, but, had the snow slopes been in good condition, it would have presented little difficulty. In place of snow, however, we again encountered solid ice, and so were forced for a short distance to take to a slope of varied rock and ice, depending on the most uncertain of hand- and foot-holds.

But soon we made our way upward by means of a short chimney, so narrow that I could not get through, but had to swing out over it. This passed, the summit lay but a few steps beyond, and the last peak of the great quartette that had for so

many years challenged mountaineering enterprise was conquered. The view from Mt. Biddle is extremely fine, superior to either that obtained from Hungabee or Deltaform, but scarcely rivaling the magnificent panorama from Goodsir. The climb is a very interesting one, especially if our route over a portion of the south arête be taken. Could a camp be established in the valley of Mesco Creek, four or five hours should give ample time to make the climb. From our camp in Prospector's Valley the long circuitous journey required nine hours, and it was three o'clock when we reached the summit. After erecting a "stone-man" and taking a few photographs, we left at about 3.30, and varying our route by coming directly down the steep rock slope just before reaching the arête, we saved considerable time and obtained some fair glissading on the lower snow-fields.

We then had the long and wearisome tramp back to our camp in Prospector's Valley. Not caring to descend by moonlight the steep rock wall we had climbed in the morning, we made a further détour, crossed the ridge at a lower point, and by the uncertain and doubtful aid of a goat trail, which lost itself completely at the most inopportune times, we finally reached the floor of the valley some half a mile below our camp. It was nearly 11.30 when we arrived at the tent, thus making more than seventeen hours for the entire trip. Next day we once more assumed our heavy packs and toiled slowly up the steep slopes of Prospector's Pass, whence we made a rapid trip out to Lake Louise.

A day or two later, storms of rain and snow descended upon the mountains, and the climbing season of 1903 was at an end. We had cause for no regrets, however; "the challenge of the Canadian Rockies" had been accepted,—our work was accomplished.

Note on Glacial Topography in Central New Hampshire.

BY PHILIP EMERSON.

WHEN a mountain Rambler steps upon the snow banks that may be found during early summer beneath the head wall of Tuckerman's Ravine, he finds a peculiar pleasure in thinking of the wild scenes of winter, when storm winds fling the reeks

of snow they have swept from the summits down over the bleak precipice. The mental picture is in sharp contrast to the summer flowers of the hanging gardens and the bright gleams from the Fall of a Thousand Streams. Imagination plays an important part in our enjoyment of the landscape. A knowledge of geology or physiography need not make one a dry-as-dust scientist, oblivious to the natural charms about one. Such knowledge may and should add much to one's enjoyment of a summer's tour, because many scenes will reveal to the mind's eye pictures of days long past and surroundings quite other than those of the present, yet no less interesting and possessed of elements of beauty and grandeur.

The "records of the rocks" are usually too obscurely expressed for a passer-by to read their legends of the past. They resemble ancient parchments where one writing has been half erased that another account might be recorded thereon. The earth's crust has had so many ups and downs in its lifetime that its several successive stories are often hopelessly confused. It is otherwise with the latest changes, those of the close of glacial time. Many curving ledges still bear evidence of the polish and striæ given them by the continental glacier. Travelling through the valleys of New Hampshire and Vermont, one often finds a succession of dams, formed by moraines, alternating with lakelets or swampy meadows, — for instance on the road from Freedom through Eaton to Conway. In imagination a valley glacier extends northward from the moraine on which one stands; no forests clothe the hillsides, and very little life appears; the stream rushing from beneath the ice, half choked by its burden of waste, is all that enlivens the picture.

Every year a large party of the students attending the New Hampshire Summer Institute at Plymouth take a carriage trip to Newfound Lake. Driving southward from the terraces of the Baker River intervale, one passes a succession of stony, uneven moraines, and fertile meadows that are the bottoms of former lakes. One moraine loops across the valley finely, and marks where the glacial tongue that still pushed over the divide halted on its retreat from Newfound Lake. A little valley rises northward where two curves of the moraine meet, its bottom filled with boulders. At the steep north face of the moraine,

the former ice front, the regular ascent of the graded channel suddenly ends in air. Where are the head waters? The boulders around which a foaming stream once coursed, witness to the waters that cut away the gravel in which they were formerly embedded. The conditions most impressively convince one that ice once filled the valley northward. Then the little valley was continued into the mass of the glacier, and a tumultuous stream issued from beneath the groined ceiling of its englacial channel. The fertile fields and meadows of the old lake bed south of the rough moraine present a fair picture of prosperity, the greensward is beautiful in its setting of forest-clad hillsides, — it is a refreshing contrast to the rough sheep pastures of the moraine tract. On a dreamy summer's day the mind builds romances about the lucky owner of this valley floor and the struggling tenants of the stony slopes; but the moraine and its little valley reveal a tale as attractive as any romance, and possessed of the vital interest of real life, because true.

During the past summer the writer spent a fortnight in Tuf-tonboro, which lies south of the Ossipee Mountains, on the east shore of Lake Winnepesaukee. While driving or wheeling along the country roadways, I noticed the many forms taken by the burden of waste dropped by the glacier during its slow retreat. It was natural to attempt to recognize the successive stages of its recession. As opportunity may not offer to revisit the district, I offer my conclusions briefly that they may serve to stimulate the observations and the enjoyment of others.

It would appear that the broad outlying monadnock of the Ossipee Mountains once stood out as a nunatuck above the retreating glacier. The ice flowed around it through the Ossipee and Winnepesaukee valleys. Later the ice melted back from the highlands of Tuf-tonboro, in the lee of the Ossipee Mountains. The glacial lobe that filled the Winnepesaukee basin slowly shrunk, halting here and there, and leaving its marginal moraines on the Tuf-tonboro slopes as rocky ridges parallel with the present trend of the eastern shore of the lake. These are easily recognizable to-day. They are irregular ridges whose surface is covered with massive boulders. One divides Mirror Lake from Tuf-tonboro Bay, and forms a causeway for the road from Tuf-tonboro Neck towards Wolfboro. It is locally known

of snow that have swept from the north and
 inland positions. The second picture is that of
 the summer forests of the mountain regions as they
 stand the Fall of a Thousand Years. In the
 landscape part of our curriculum of the history of
 the state of New Hampshire we have not
 only the history of the state but also the history of the
 knowledge that we should add much to a
 student's work. Because many scenes will be
 pictures of days long past and surrounding
 time of the present, yet so less interesting
 elements of beauty and grandeur.

The "records of the rocks" are usually
 pressed for a passer-by to read their legends.
 The ancient pavements where one writ-
 er said that another account might be recor-
 ded. The earth's crust has had so many ups and downs
 its several successive stories are often hope-
 lessly otherwise with the latest changes, those of the
 time. Many curving ledges still bear evidence
 of the given them by the continental glacier. In
 the valleys of New Hampshire and Vermont,
 succession of dams, formed by moraines, alter-
 nate with swampy meadows, — for instance on the
 road through Eaton to Conway. In imagination
 extends northward from the moraine on which
 forests clothe the hillsides, and very little li-
 stream rushing from beneath the ice, half chok-
 ed with waste, is all that enlivens the picture.

Every year a large party of the students at
 Hampshire Summer Institute at Plymouth take
 to Newfound Lake. Driving southward from
 the Baker River intervalle, one passes a suc-
 cession of moraines, and fertile meadows that are
 former lakes. One moraine loops across the va-
 lley where the glacial tongue that still pushed
 halted on its retreat from Newfound Lake.
 Then northward where two curves of the moraine
 are filled with boulders. At the steep north face of

l that it be kept open

893 the Club already in the Presidential for the use of per- that vicinity. Since shire have come into the nature of public Club was amply just- in our sister State. property in Massa- eeping. This may e Trustees of Pub- supplementing it. nly able to under- suitably endowed Mountain Club, to tenance from its [n the case of the usetts no adequate both were lands benefit. It must, und sufficient for the Club to use such land either n other words, its ability to protect

ervations a board y the Club in 1894. Club at large, one a Trustee being the resenting the Depart- officer is elected annu- ay be a candidate for ne governing board and

tions to which
JWS: —

as The Narrows. Other moraines form little islands off shore. Yet others connect rock islands with the mainland, forming necks.

As the glacial lobe retreated, the melting ice supplied abundant waters, and waste-burdened streams rushed along beneath or upon the mass of ice and débris. Their records are found to-day, for their channels in the ice were often choked by coarse gravels, so that winding ridges now mark their former course. Such ridges were first called eskers in Ireland. These streams often issued into marginal lakes beside the glacier, and built sand deltas of level top and steeply sloping margins. Icebergs or other masses of ice became embedded in the sands, and when these melted in later years little inclosed valleys were left, which are known as kettle holes, and the old deltas are therefore pitted sand plains. Driving from Wolfboro to Tuftonboro Center, a series of these plains lies at the right opposite the cross road that enters the highway from the south shore of Mirror Lake. An esker marks one channel of the stream that produced the delta. There are several levels of the sand plain, showing that as the ice retreated the marginal lakelet of the side valley, whence a meadow trout brook flows to-day, found lower and lower outlets.

Traversing the dry grass tufts and crumbly lichens of these sterile sand plains, one comes at last to the ledges and boulders of the hillside, the former shore of the little lake. The line that separates the till of the slope and the water-sorted gravels of the levels is marked by a belt of water-worn cobblestones, a rod or two in width. This may be followed northward until it runs into a low esker ridge. Long ago a stream of water rushed out from beneath the glacial lobe at its margin, then flowed along over a bed of such small boulders as it was able to push down its sloping channel. Its little valley lay between the barren hillside on its left bank, now forested, and the glacier that sloped upward on its right, now vanished. There is the same romantic interest in such a discovery that is connected with finding an Indian arrowhead or the ashes and potsherds of an old camping place. Each reveals a story of the past whose environing details the trained imagination may reconstruct.

Here and there along the slopes of Tuftonboro, eskers and

sand plains are found. Two other examples are most readily noted. The many-gabled buildings and Normandy poplars of Edgerly Farm, overlooking Union Landing, Tuftonboro, are upon the end of an esker. Just east of Tuftonboro Center an esker ridge ends in fields of coarse gravels that are heaped in irregular hillocks and hollows, — kames and kettle holes. Evidently ice and gravel were here much intermingled at the broken ice margin.

Near Ithaca, New York, Professor Ralph S. Tarr of Cornell University is studying the full story of the retreat of the ice front thereabouts, as revealed in the moraines and other waste forms that remain. The results will be published in an atlas of the United States Geological Survey, for the instruction of the public. Only a little of the mountain region of northern New England has as yet been mapped. So many tourists visit the lakes and hills of the region that the national government should be induced to map the frequented sections without further delay, and encouraged to undertake the publication of detailed accounts of the physiography, as has been done for other sections. The Appalachian Mountain Club may wisely exert its influence to secure such action.

The Club's Reservations.

BY ALLEN CHAMBERLAIN.

It was in March, 1890, that the late Charles Eliot, then a member of the Council of the Appalachian Mountain Club, began, through the instrumentality of that office, to enlist public interest in a plan to preserve beautiful and historic sites in Massachusetts. That effort, to which the Club lent its full strength, resulted first in the organization of the Trustees of Public Reservations through a special act of the Legislature. It also contributed to the creation of a similar body in England. By this act a corporate body was established "for the purpose of acquiring, holding, arranging, maintaining, and opening to the public, under suitable regulations, beautiful and historic places and tracts of land within this Commonwealth." Such property was limited by statute to a value of one million dollars, and the

Trustees were further empowered to acquire personal property to a like amount, the income from which was to be devoted to the maintenance of the real estate, all this property to be exempt from taxation so long as it is open to the free use of the public, subject only to suitable regulations prescribed by the Trustees.

The second result of the above-cited effort was the organization of the Metropolitan Park Commission. This was accomplished directly through the agency of the newly organized Trustees of Public Reservations. To this last, and most important movement, the Appalachian Mountain Club also gave its support. Through the Park Commission the cities and towns of the so-called Metropolitan District were provided with ample powers and funds for the acquiring and developing of reservations of wild lands. Still the usefulness of the Trustees of Public Reservations was not in any wise diminished by the establishment of the Park Commission. The latter stands for a specific local purpose. The Trustees remain to care for such other lands, within or without the Metropolitan Park District, as private or public interests may bring to it and dedicate to public use. The board of Metropolitan Park Commissioners is a creative organization subject to legislative direction. The Trustees of Public Reservations is a guardian body purely.

With Massachusetts so well provided for, the Appalachian Mountain Club wished, for most natural reasons, to see a similar work begun in the State of New Hampshire. Although a Massachusetts corporation, one of the chief fields of the Club's activities had always been the mountain districts of the Granite State. Why should not the Club undertake the work directly? This question was presented to its Council in 1893 by Professor C. E. Fay, the President for that year. The answer was a petition to the Massachusetts Legislature that its charter rights might be extended to enable the corporation to hold real estate. This was at once granted, the act providing that where such real estate lay within this Commonwealth and was unproductive of revenue to the Club beyond the cost of maintenance, and was kept open to public use, it should be exempt from taxation. In 1903 the New Hampshire Legislature also passed an act exempting from taxation such real property of the Club as

lay within that State at that time, provided that it be kept open to public use under suitable regulations.

At the time of the charter extension in 1898 the Club already held a single small parcel of real estate in the Presidential Range, on which was built a hut of refuge for the use of persons following the higher mountain trails in that vicinity. Since that time eight other parcels in New Hampshire have come into the Club's ownership, all but one being in the nature of public reservations. Thus it is apparent that the Club was amply justified in entering upon this new field of work in our sister State.

It has also happened that two pieces of property in Massachusetts have been given into the Club's keeping. This may seem to some like paralleling the work of the Trustees of Public Reservations, but in reality it is only supplementing it. The Trustees of Public Reservations are only able to undertake the management of property which is suitably endowed with a maintenance fund. The Appalachian Mountain Club, to a limited extent, can provide for such maintenance from its current revenues, when absolutely needful. In the case of the two reservations held by the Club in Massachusetts no adequate endowment accompanied the gifts, and yet both were lands distinctly worthy of preservation for public benefit. It must, nevertheless, be evident that, without some fund sufficient for general maintenance, it will be necessary for the Club to use the utmost conservatism in accepting gifts of such land either in Massachusetts or in New Hampshire. In other words, its usefulness in this particular is limited by its ability to protect its trusts.

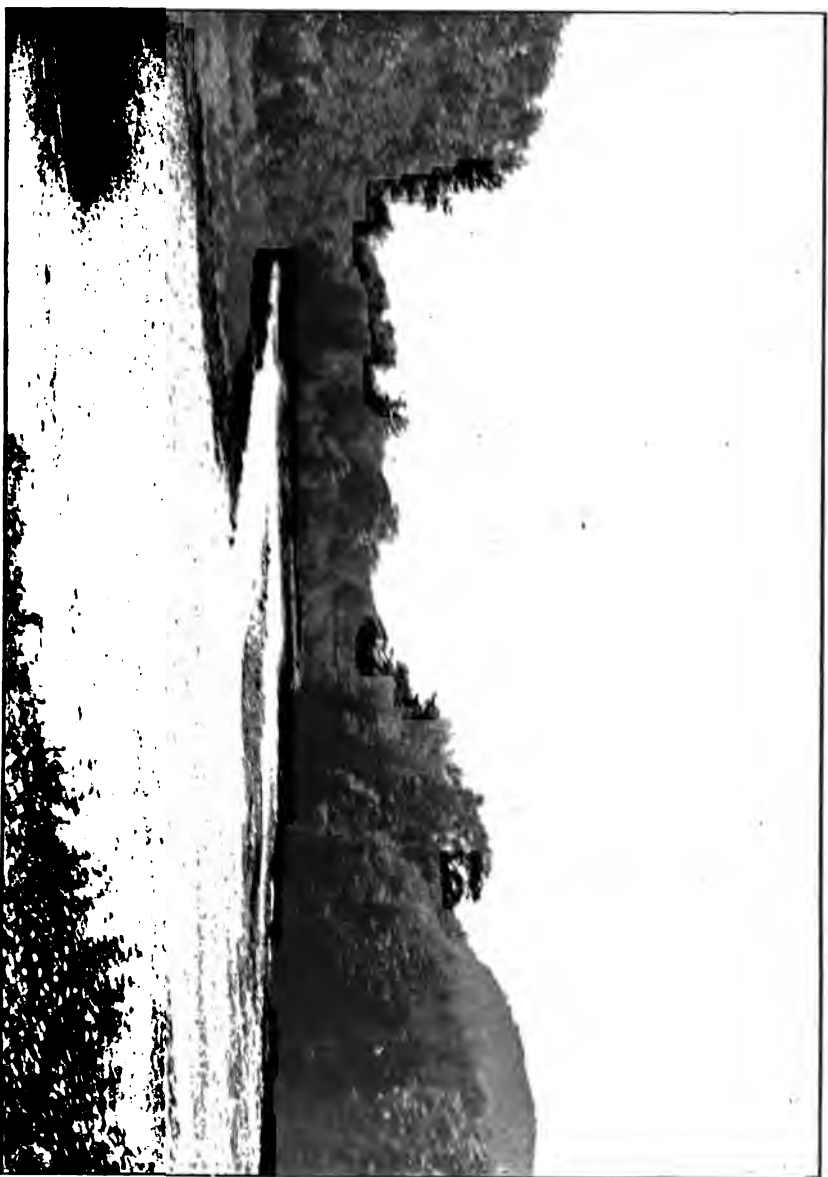
To provide for the management of these reservations a board of five Trustees of Real Estate was created by the Club in 1894. Four of these Trustees are chosen from the Club at large, one each year for a term of four years, the fifth Trustee being the member of the Club's governing board representing the Department of Exploration and Forestry. This officer is elected annually for a one-year term, though he may be a candidate for three successive terms. Through him the governing board and the Trustees are kept in touch.

A brief description of the reservations to which the Club held title on November 1, 1908, follows:—

IN NEW HAMPSHIRE.

Madison Spring Reservation.—Located in the saddle between Mounts Adams and Madison, at an elevation of over 4820 feet above sea, and on the paths leading from Randolph across the Presidential Range to the summit of Mt. Washington, this reservation, with its stone refuge hut and spring of good water, is of great service to hundreds of mountain tourists every year. The hut was built by the Club in 1888–89, and the acre of ground surrounding it was presented to the Club October 1, 1888, by the Brown's Lumber Company of Whitefield, N. H. The hut accommodates ten persons, and is supplied with bunks, stools, blankets, stove, and cooking utensils. The reservation commands a good view to the north, and a most impressive outlook south across the Great Gulf to Mt. Washington is obtained from "the Parapet," so called, not many yards distant. The reservation is reached most directly from the Ravine House at Randolph by the Madison path and its continuation, the Valleyway, distance, $3\frac{1}{2}$ miles.

Lead Mine Bridge Reservation.—This charming bit of river-bank country, twelve acres in extent, was the gift of Miss Anne Whitney of Boston, in February, 1897. It lies in the town of Shelburne, N. H., on the banks of the Androscoggin river, and borders both sides of the highway at the point where the Lead Mine bridge crosses the stream. This land was occupied, previous to the Club's ownership, by a sawmill and several squalid dwellings. These have been removed, the mill site planted to white pine, open stretches of grass provided, and the existing natural tree and shrub growth cherished. The reservation commands a charming stretch of river scenery, while the view up stream from the bridge to Mount Madison, shown in the illustration, has been characterized by Starr King as one "which at once takes the eye captive, and not only claims front rank among the richest landscapes that are combined in New Hampshire out of the White Mountains and the streams they feed, but impresses travellers that are fresh from Europe as one of the loveliest pictures which have been shown to them on the earth." The reservation is reached by driving from Shelburne, 2 miles; from Gorham, $3\frac{1}{2}$ miles; from Randolph via Gorham, 10 miles.



VIEW FROM LEAD MINE BRIDGE.

From a photograph by L. F. Cutter.

Snyder Brook Reservation. — It was in May, 1895, that the Club itself, at the instance of the Trustees, raised the money with which to purchase this tract for the purpose of saving a strip of original White Mountain forest from imminent logging operations. The area is approximately 36 acres, lying in the town of Randolph, but its outline is most irregular as it follows the course of Snyder Brook in its winding plunges down the mountain side. The boundaries lie three hundred feet on either hand of the brook for a distance of about half a mile up the mountain, beginning from the Boston & Maine Railroad location near Appalachia station. Through this bit of ancient mixed forest, in every way typical of the wilderness which once covered all the lower mountain slopes of that region, runs the path to the Madison Spring Reservation, and on the brook itself are some of the prettiest falls and cascades anywhere to be seen. Reached from Appalachia station on the Concord & Montreal Division of the Boston & Maine Railroad, near the Ravine House, Randolph.

Joseph Story Fay Reservation. — This, the largest reservation belonging to the Club, lies in the towns of Woodstock and Lincoln, N. H., and was the gift in 1897 of Miss Sarah B. Fay, in memory of her father, whose name it bears. The land, about one hundred and fifty acres in all, lies along both sides of the old stage road from North Woodstock to the Flume and the Profile. It is just outside the village of North Woodstock and at the southern end of the Franconia Notch. On the eastern side of the road, and between it and the Pemigewasset river, lies a strip, generally long and narrow, but broadening out into small grassy glades here and there, revealing glimpses of the rapid stream. In the grassy openings are a few gnarled old apple trees, while for the rest there are little groves and belts of young white pine and sugar maple, oak, birch, and beech. This river section is comparatively small, but by reason of its reaching down to the edge of the village, and with its open park-like spots, and pretty sylvan island in the stream, it is of great value to the people of North Woodstock, and to their summer guests. The main body of the reservation lies upon the westerly side of the highway, and while it does not reach so near the thickly settled portion of the

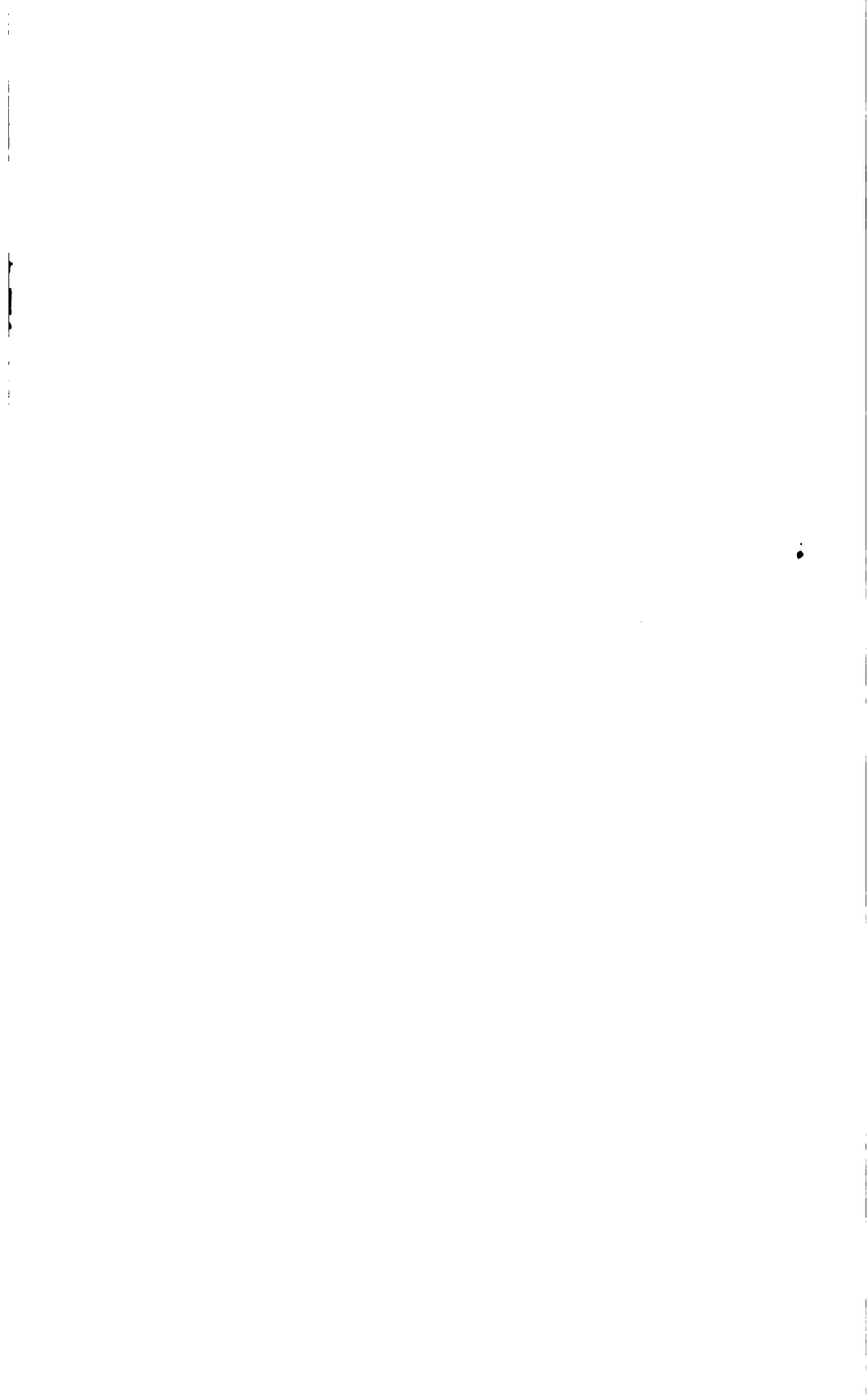
place as does the river section, yet it is not far removed. In its own particular way it is as fine as the stretch along the stream. The tract rises from the road to quite a little hill, affording a pretty view south, across the village to the mountains beyond, and east up the East Branch into what was formerly known as the Pemigewasset Wilderness. From the northern end of the ridge, near the boundary on that side, can be seen a real mountain picture framed in the tall trunks of the old trees, a vista up into the Franconia Notch. Soon after the acquisition of this reservation this ridge attracted the attention of Professor William H. Niles of the Massachusetts Institute of Technology, then president of the Club. Upon investigation he decided that this was a glacial terminal moraine of considerable interest. The ridge is clothed with a fine mixed forest, mostly secondary growth, but with a liberal sprinkling of veterans of size. On the side farthest from the road the land falls off to a piece of low, wet ground, where thrive dense masses of fern and bracken. Mr. John C. Olmsted, landscape architect, a member of the Club, has made a careful professional examination of the reservation, and filed with the Trustees a report on the conditions as he found them, and carrying detailed suggestions to guide in its improvement. All work of development is therefore planned to conform to this general scheme. In the summer of 1903, Mr. E. G. Chamberlain of the Club made a topographic map of the reservation at the request of the Trustees. This map will greatly assist the Trustees in laying out future improvements, and prints from it will be of value to visitors. The reservation is reached from North Woodstock village, $\frac{1}{2}$ to 1 mile.

Three Mile Island. — This piece of property is the only one in the Club's possession which is not open to the public. It is held for the exclusive use of the Club as a camping spot, and is not, therefore, exempt from taxation. The island, about forty acres in extent, lies at the northern end of the "Upper Broad" in Lake Winnepesaukee, some six miles northeast of the Weirs, and three miles south of Centre Harbor. In character it is picturesquely rocky, and is covered with a heavy stand of mixed timber with a richly diversified undergrowth of herbs and shrubs. This property came to the Club by reason of a gift of a portion of the island in 1900 by Mr. and Mrs. Edson C.



BRIDGE IN THE FAY RESERVATION.

From a photograph by Sanborn.



Eastman of Concord, N. H., club members, but its extent has been increased by further gifts from R. B. Lawrence, Esq., and by purchase through funds subscribed by many club members, until the entire island is now owned. In 1901 a commodious clubhouse was built on the southern end of the island. Each succeeding summer a camp of tents has been pitched in July and August, to which club members have resorted in increasing numbers, some for a few days only, others for the full season. Members may furnish their own tents or rent them of the Club, locations being assigned by the committee in charge, and all meals are served at the clubhouse. Improvements are added to the property yearly, such as a boat house, a well, gas-engine pump, and water-tower, the latter also serving as an observatory, and all provided from the receipts of the camp. The capacity of the camp is approximately sixty people. Any extension beyond that number it is believed would tend to unduly crowd the island, and defeat one of the chief objects of the camp. Under the careful supervision of professional arboriculturists, members of the Club, the plant growth of the island has been fostered by judicious cutting and planting. Paths have been cut to make the remote portions of the island readily available, and vistas opened where the view was obscured by the dense stand of trees. The outlook from the island is most restful and charming, down the island-studded lake southward to the Belknap mountains, Tumbledown Dick and Cropple Crown; to the high, wooded Meredith shore on the west; to the long, black stretch of the Ossipee range on the east; and to Black Mountain and Chocorua of the Sandwich mountains on the north. Reached from Weirs station on the White Mountain Division of the Boston & Maine Railroad, whence from June to October a steamer plies to Bear Island landing. The Club landing on Three Mile Island is one mile north of Bear Island wharf.

Farrar Reservation. — As a memorial to her husband Mrs. Hattie A. Farrar of Boston deeded to the Club in October, 1901, a four-acre tract with a new and commodious rest house and horse shed, situated on the southerly shoulder of South Pack Monadnock mountain in the town of Temple, N. H. The property commands a broad view across southern New Hampshire.

and into Massachusetts. A good wagon road, built and maintained by the State of New Hampshire, leads up the mountain, past the Club's reservation, to the General James Miller Park, a State reservation, on the summit. It is within easy drive of Dublin, Jaffrey, and Peterborough, notable summer resorts, and it is hoped that this reservation, with its fine spring of water and shelters, may become a valuable feature of that section. Reached from Dublin, 12 miles, Peterborough, 5 miles, and South Lyndeborough, 8 miles.

South Baldface Reservation.— In the summer of 1902 Mrs. Carolin E. Clay of Chatham, N. H., widow of Mr. Ithiel E. Clay, deeded to the Club ten acres of land on the extreme summit of South Baldface Mountain in the town of Chatham. The maps give this summit an elevation of 3585 feet above sea. The mountain, as seen from the Chatham base, is a noble mass with a vast, round, rocky head and shoulder. A disastrous forest fire in May, 1903, started in the Wild River Valley lying northwest of Baldface, and between it and the Carter range, and spreading out in all directions it burned over some 10,000 acres of forest and mountain top, including the almost barren crags of South Baldface summit. The nearer landscape, as seen from the summit, was thereby greatly mutilated, although the broader views to Mt. Washington and the Great Range on the west, to Kearsarge and Chocorua on the south and southwest, and far out into the State of Maine on the east, still remain as beautiful as ever. It is one of the widest prospects to be had in the White Mountains. The summit is reached by a good trail from Asa Chandler's farm in North Chatham, which is nine miles by stage from the railroad at Fryeburg, Me. The trail on to the mountain as shown on the latest maps of the region is an old and disused one. Both the old and the new trails start from the same point.

Kearsarge Reservation.— By the same instrumentality as the above the Club possesses a ten-acre tract on the summit of Kearsarge North Mountain, with refuge house. Every one knows of Kearsarge Mountain (sometimes called Pequawket-Kearsarge), whether he be a visitor to the region or not. It has been famous in song and story for years, and its name has been fixed upon our naval history by the famous Kearsarge-



SUMMIT OF MT. BALDFACE.

HOUSE ON MT. KEARSARGE.

HOUSE IN FARRAR RESERVATION.

MADISON SPRING HUT.

VIEW IN FAY RESERVATION.

CASCADE IN SNYDER BROOK.

MT. GRACE.



IN THE RHODODENDRON RESERVATION.
By courtesy of "Woodland and Roadside."

Alabama engagement of the Civil War. It has been, and probably is to-day, visited by more people than most of the peaks unprovided with wagon road or rail transportation. The summit lies in the town of Chatham near the border of Bartlett, and has an elevation of 3270 feet. The refuge house is a story and a half frame building built in 1884 on the topmost ledges, and is a landmark for many miles. The house is a good deal out of repair, not having been kept up in any reputable sense for years. During the summer it is occupied in part by Mr. Eastman from Kearsarge Village, who furnishes simple refreshment for visitors. The entire top of the mountain at the time it came into the Club's possession was in a most squalid and disgusting state, as a result of the untidiness of picknickers. This the Trustees hope to remedy by an arrangement with the tenant of the house, whereby he shall clear the reservation of all rubbish and keep it so during his tenancy. The summit is reached by trail from Intervale via Kearsarge Village, distance 5 miles, and from South Chatham, distance 4 miles.

Rhododendron Reservation.—During the autumn of 1902 the Trustees of Real Estate received a communication from a summer visitor at Fitzwilliam, N. H., to the effect that a large tract of *Rhododendron maximum* growing in that town was in danger of annihilation through a contemplated logging operation. It was stated that this was the largest known natural bed of this plant in New England, where it is far from common. The matter was referred to one of the Trustees, who was also later consulted by the Society for the Protection of Native Plants as to what organization could care for such a property after it was once secured. As a result Miss Mary L. Ware of Boston, a distinguished patron of botanical science, purchased the entire farm of which the rhododendron swamp was a part. The whole property was then deeded to the Appalachian Mountain Club with the proviso that the areas upon which the rhododendron grows, some ten acres or a little more, with the sheltering growth of spruce, hemlock, and pine, should be held in perpetuity as a public reservation. The balance of the property, something under three hundred acres in extent, with the typical old farm buildings, is to be regarded as an endowment for the reservation. It is hoped that a responsible tenant may be

secured for the farm, but the features of the property which are expected to eventually produce the most income are the exceptionally fine silica spring and silica deposit. Both were formerly exploited commercially in a desultory way. The water of the spring has been analyzed by the State Assayer of Maine, and it is said by him to be a remarkably pure, soft water containing medicinal properties of importance. The reservation lies at the base of Little Monadnock, or "West Hill," as it is locally called, and the swamp has an elevation of nearly 1200 feet. From the farm house, which stands on a knoll, is had a superb view of the Grand Monadnock. The best time for a visit would be in early July, when the rhododendrons are in blossom. They do not bloom every year, and only once in three or four years are they at their best. The year 1903 was an especially barren one, but the buds in the fall indicated a fine display for 1904. The flowers of this group are both white and rose-colored. Probably nowhere else north of the Allegheny Mountains can this plant be seen growing naturally in such masses, and the rhododendrons and their sheltering conifers stand here in remarkably picturesque combination. At the time of the transfer to the Club the logging operations had extended on one side well up to the rhododendrons, and the ground was considerably littered with slash. This fire menace the Trustees have sought to remove by gathering and burning a large part of the débris. The reservation is reached from Fitzwilliam station, on the Fitchburg Division of the Boston & Maine Railroad, over three miles of pleasant country roads. From Fitzwilliam Village it is two miles and a half, and from Troy it is four miles.

IN MASSACHUSETTS.

Parsons Reservation.—In December, 1897, Mr. Albert Stevens Parsons, a former president of the Club, and his co-heirs in the estate of Joseph Stevens, deeded to the Club a tract of forty acres on Mt. Grace in the town of Warwick, Mass. The summit of the mountain has an elevation of 1628 feet, and is easily reached from the reservation, which includes the eminence known as Bennett's Knob, 1490 feet above sea. The view from the knob is in many respects finer than that from the summit, and includes the Monadnocks just over the



AMONG THE CARLISLE PINES.

By courtesy of the Boston Globe

of the Forestry Association and the deeds held in escrow for the benefit of the Appalachian Mountain Club. By late February the fund was complete, and the deeds delivered to the Club's Trustees, together with a small sum in cash to be used as an improvement fund. The pines run from $2\frac{1}{2}$ to $3\frac{1}{2}$ feet in diameter at breast height, and are from 100 to 120 feet tall. Reached most readily from Boston via Arlington Branch of the Boston & Maine R. R., or by trolley to Bedford, thence drive or walk six miles via Carlisle Village to E. L. Dow's house on Curve street (Chelmsford road). The pines may also be reached via Boston & Maine R. R. to Concord Junction, where change is made to the New York, New Haven & Hartford Railroad branch to Lowell, stopping at Carlisle station. This is a flag station only and trains are few. The reservation is about a mile distant. One may also drive easily from Concord or Chelmsford. The reservation lies back half a mile from the highway over a rough wood road from Mr. Dow's house. With the consent of the Carlisle selectmen a sign has been placed on the highway at the entrance, and fingerboards have been located at intervals along the wood road.

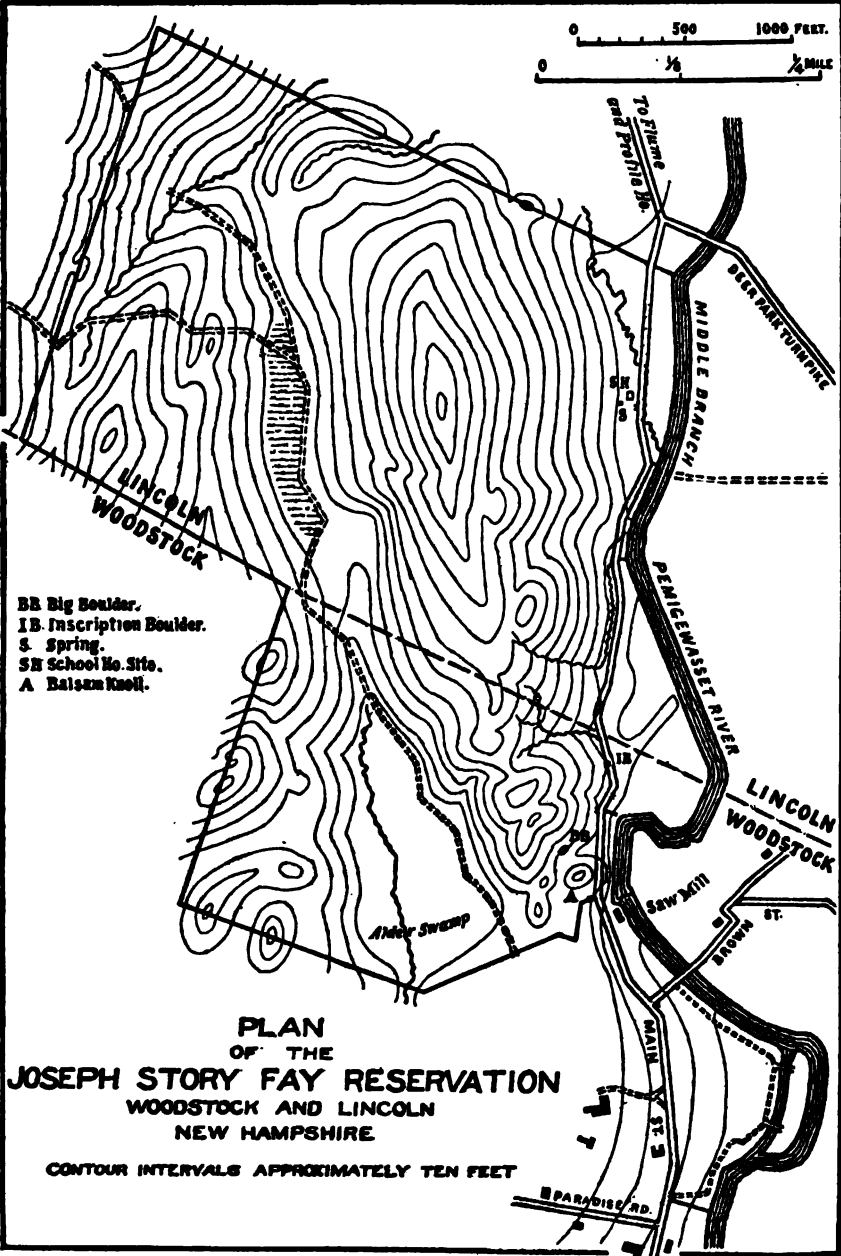
Report of the Recording Secretary for 1903.

ON January 1, 1904, the total membership of the Club was 1529, an increase of 115 over the number reported one year ago.

The Honorary Members numbered 18, Professor William H. Brewer and Dr. Julius Hann having been added, and the Corresponding Members 50, Professor William North Rice having been added. There were 217 Life Members and 1244 Annual Members, making 1461 members of the Corporation. During the year, 14 members deceased, 55 resigned, and 29 were dropped for non-payment of dues. The new members numbered 231.

There were held during the year 9 regular, 10 special, and one field meeting, the average attendance being nearly 300. Omitting the two meetings in December, which were attended by over 1000 persons each, the average was the same as last year, 200.

There were presented during the year, besides 13 reports of



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Journal of Management Studies, 37(6), 809-826.

officers and committees, 19 papers, of which 14 were illustrated with the lantern. One evening was devoted to the Arctic regions, two to Europe, and one each to the West Indies, Central and South America. Canada had four papers, New Brunswick and Nova Scotia one each, and the Canadian Rookies two. California and Arizona had one each, and there were five papers of a general character which incidentally dealt with New England and the White Mountains. Two meetings were devoted to the amendment of the By-laws and two to discussion of the hygiene and equipment in mountain climbing.

The lease of the Club rooms in the Tremont building has been renewed for a term of one year ending October 31, 1904. It was thought by the Council that it might be possible the coming autumn to make some change which would be advantageous to the Club. Although more space is needed, the expense of rent should not be increased.

The Field Meeting was held at the Intervale House, North Conway, N. H., June 27 to July 6. Accounts of this meeting and of the excursions of the year will be found in the report of the Excursion Committee. Information as to the work of the Departments will be found in the reports of the several Councillors.

The Snow-shoe Section elected Mr. W. R. Davis, Chairman, Mr. R. B. Lawrence declining a reëlection, after serving in that position since the organization of the section in December, 1886. Miss C. M. Endicott was elected Secretary and Treasurer. The membership is now 184.

The annual social meeting was held at the Hotel Vendome, on Friday evening, February 6, with an attendance of 264. A balance of \$45.50 was paid into the treasury.

One number of APPALACHIA (Vol. X., No. 2) was published in May. An exchange of publications has been arranged with the Sierra Club of San Francisco, APPALACHIA being sent to the members of that organization, for which the two numbers of its Bulletin are sent to all members of the Appalachian Mountain Club.

A valuable piece of property, a farm of three hundred acres with buildings, in Fitzwilliam, N. H., was generously given to the Club by Mary Lee Ware, of Boston. An addition has been made to the Camp upon Three Mile Island, Lake Winne-

pesaukee. A description of these acquisitions will be found in the report of the Trustees of Real Estate.

Finally, it should be mentioned here that the admission fee of the Club has been raised from \$5.00 to \$8.00, the annual fee from \$3.00 to \$4.00, and the life membership fee from \$30.00 to \$50.00. It is hoped that an increased income will enable the Club to broaden its work and extend its influence and thus perform greater service to the community.

Respectfully submitted,

ROSEWELL B. LAWRENCE,
Recording Secretary.

Report of the Corresponding Secretary and Librarian for 1903.

THE Corresponding Secretary has to report an increase of two in the number of societies and institutions with which the Club is in relations of interchange, which now aggregate 120.

Besides the exchanges, 113 volumes have been added to the library, 16 of which were purchased, 89 given by members, and 8 the gifts of authors or publishers. 178 maps have been added, 172 through exchange with the U. S. Geological Survey and 6 from the Maryland Geological Survey. Of the series of volumes which have been received in exchange two are of great value, a set of reports of the Department of the Interior of Canada and the reports of the Maryland Geological Survey, of which series duplicate maps have been sent for the map case. To accommodate the increase in the library a fifth section of Wernicke cases has been placed in the Reception Room.

During the year a new system of arranging the maps of the U. S. Geological Survey has been adopted, boxes taking the place of the portfolios, which are not satisfactory where the weight is concentrated within comparatively small area. The boxes are arranged by states.

Work on the card catalogue has been continued during the year with the volunteer assistance of Misses Lanning, Wells, and Batchelder. Miss Lanning has analyzed all the volumes of the American Geographical Society and those of the Alpine Club and

is now at work on APPALACHIA, while Miss Wells has cared in like manner for the volumes published by the Sierra Club. Miss Batchelder has continued work on the scrap books and the cataloging of special books, Miss Vinal caring for the periodicals.

A detailed list of the accessions in books follows.

Accessions to Library in 1903 other than by Exchange.

DONATIONS.

[Names of Members in Italics.]

- Adventures of Belzoni in Egypt and Nubia. Gift of *C. W. Folsom*.
 All about Yellowstone Park. A. B. Guptill.
 Appleton's General Guide to United States and Canada.
 Appleton's Guide to Mexico. A. R. Conkling. Gift of *J. Ritchie, Jr.*
 Appleton's Illustrated Handbook of American Travel. T. A. Richards.
 Gift of *C. W. Folsom*.
 Barren Ground of Northern Canada. W. Pike. Gift of *J. Ritchie, Jr.*
 Berkshire Hills : Drives and Walks. Gift of *A. D. Wilde*.
 Botanical Textbook. Asa Gray. Gift of *C. W. Folsom*.
 Calabria and the Liparian Islands in 1860. E. Melena.
 Canada. Report of the Department of the Interior, 1886-1902. 17 vols.
 Gift of *E. Deville*.
 Canterbury Guide. Gift of *C. W. Folsom*.
 Catalogue of Romanized Geographical Names of Korea. B. Koto and S. Kanazawa.
 Chouruns du Dévoluy. *E.-A. Martel*. Gift of author.
 Conservative Lumbering at Sewanee, Tennessee. J. Foley. Gift of *A. Chamberlain*.
 Corona and Coronet. M. L. Todd. Gift of *J. Ritchie, Jr.*
 Cruising among the Caribbees. C. A. Stoddard. Gift of *J. Ritchie, Jr.*
 Days near Rome. A. J. C. Hare. Gift of *J. Ritchie, Jr.*
 Defense of the Panama Route. *A. Heilprin*.
 Effects of Exercise on the Heart and Circulation. R. C. Larrabee. Gift of author.
 Enseignement de la Géographie. E. Reclus. Gift of Institut Géographique de Bruxelles.
 Evolution of Climates. M. Manson. Gift of author.
 Exploration Souterraine en France. *E.-A. Martel*. Gift of author.
 First Aid to the Injured. O. Bernhard. Gift of *M. L. Delafield, Jr.*
 Flora of the South Fork of Kings River. A. Eastwood.
 Forest Trees and Forest Scenery. G. F. Schwarz. Gift of author.
 Franconia Avalanche. H. M. Burt. Gift of Mrs. H. M. Burt.
 Golden Caribbean. H. R. Blaney. Gift of *J. Ritchie, Jr.*
 Gouffre et la Rivière Souterraine de Padirac. *E.-A. Martel*. Gift of author.

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- Grazing in the Forest Reserves. F. Roth.
 Grotta Nocé. E. Boegan.
 Guida di Pavia. M. Malaspina. Gift of C. W. Folsom.
 Guida di Pozzuoli. A. de Jovio. Gift of C. W. Folsom.
 Guide to Chamonix and Mont Blanc. E. Whymper. Gift of author.
 Guide to the Southeastern States. E. Ingersoll.
 Guide to Zermatt and the Matterhorn. E. Whymper. Gift of author.
 Guillerías, Las. D. Julio Serra.
 Handbook to Malta. T. MacGill. Gift of C. W. Folsom.
 Headwaters of the Mississippi. W. Glazier. Gift of J. Ritchie, Jr.
 Heart Strain. R. C. Larrabee. Gift of author.
 How to Grow a Forest from Seed. F. W. Rane. Gift of A. Chamberlain.
 Hunting and Trapping on the Upper Magalloway River and Parmachenee Lake. F. C. Barker and J. S. Danforth.
 Il Forestiere Istruito. Gift of C. W. Folsom.
 Influence of Forestry upon the Lumber Industry. O. W. Price. Gift of A. Chamberlain.
 Insects of the Year in Massachusetts. H. T. Fernald. Gift of A. Chamberlain.
 Itinerario Istruttivo di Roma. M. Vasi. Gift of C. W. Folsom.
 Leucocytosis after Violent Exercise. R. C. Larrabee. Gift of author.
 List of Maps of America in the Library of Congress.
 Luftströmungen auf dem Gipfel des Säntis und ihre jährliche Periode. J. Hann. Gift of author.
 Magie chez les Insulaires Mélanésiens. R. H. Codrington. Gift of Institut Géographique de Bruxelles.
 Mt. Washington in Winter. G. Dana.
 New Ascents in the Canadian Rockies. J. Outram. Gift of author.
 New Method of Turpentine Orchardng. A. Pinchot. Gift of A. Chamberlain.
 Nouvelles Recherches et Constatations a Han-sur-Lesse. E. Van der Broeck et E.-A. Martel. Gift of authors.
 Observations Glaciaires, etc. P. Girardin. Gift of Comité Français des Glaciers.
 Observations on the Colors of Flowers. E. W. Hervey. Gift of author.
 Observations sur l'Enneigement et sur les Chutes d'Avalanches. Gift of Comité Français des Glaciers.
 Observations upon Long-distance Runners. J. B. Blake and R. C. Larrabee, editors. Gift of editors.
 On Sunny Shores. C. Scollard. Gift of J. Ritchie, Jr.
 Onzième Campagne Souterraine. E.-A. Martel. Gift of author.
 Orchard Treatment for the San José Scale. H. T. Fernald. Gift of A. Chamberlain.
 Over the Andes from the Argentine to Chili and Peru. May Crommelin. Gift of J. Ritchie, Jr.
 Pigeon Cove and Vicinity. H. C. Leonard. Gift of J. Ritchie, Jr.

- Practicability of Forest Planting in the United States. W. L. Hall. Gift of A. Chamberlain.
- Practical Suggestions for Tree Wardens. Gift of A. Moore.
- Pulse and Rhythm. M. Hallock Greenewalt. Gift of author.
- Quatorzième et quinzième Campagnes Souterraines. E.-A. Martel. Gift of author.
- Récents Explorations Souterraines. E.-A. Martel. Gift of author.
- Report of Niagara Falls Association. Gift of C. W. Folsom.
- Report of Superintendent of Forestry for Canada, 1902.
- Report of United States Board on Geographic Names. Gift of J. Ritchie, Jr.
- Restoration of the Ancient Irrigation Works on the Tigris, etc. W. Willcocks.
- Revue de Glaciologie, No. 2, 1902. C. Rabot. Gift of Comité Français des Glaciers.
- Solitaire. G. F. Willey. Gift of author.
- Spinifex and Sand. D. W. Carnegie. Gift of J. Ritchie, Jr.
- Studies of the Essex Flora. C. M. Tracy. Gift of T. P. Nichols.
- Tests on the Physical Properties of Timber. F. E. Olmsted. Gift of A. Chamberlain.
- Things as they are in America. W. Chambers. Gift of C. W. Folsom.
- Topographical Survey of Michigan. 1903. I. C. Russell.
- Travels in Tartary, Thibet, and China. 2 vols. M. Hue. Gift of J. Ritchie, Jr.
- Travels through the Alps. J. D. Forbes. Gift of E. W. Howe.
- True Tales of Mountain Adventure. Mrs. A. Le Blond. Gift of J. Ritchie, Jr.
- Under Summer Skies. C. Scollard. Gift of J. Ritchie, Jr.
- Up the Matterhorn in a Boat. M. M. Pope. Gift of A. Moore.
- Variations of Glaciers, VIII. H. F. Reid. Gift of author.
- Vegetation and Scenery in the Metropolitan Reservations of Boston. C. Eliot. Gift of J. Ritchie, Jr.
- Voyage du Jeune Anacharsis en Grèce. L'Abbé Barthélemy. Gift of C. W. Folsom.
- Walks in Rome. A. J. C. Hare. Gift of J. Ritchie, Jr.
- Wanderings in Spain. A. J. C. Hare. Gift of J. Ritchie, Jr.
- White Hills. T. S. King. Gift of Miss M. L. Gerriah.
- With a Pessimist in Spain. M. F. Nixon. Gift of J. Ritchie, Jr.
- Woodsmen's Handbook. H. S. Graves.
- Working Plan for Southern Hardwoods, etc. J. Foley. Gift of A. Chamberlain.

PURCHASED.

- Boston Sights. R. L. Midgley.
- Forestry and Forest Products. H. B. Mill and J. Rattray, editors.
- Guide to Boston. D. Pulsifer.
- Guide to Wonalancet and Sandwich Range.

Highlands of Central India. J. Forsyth.

Mont Pelée and the Tragedy of Martinique. A. Halpin.

New York ; Annual Report of the Fisheries, Game and Forest Commission, 1898, 1899.

New York ; Annual Report of the State Botanist, 1895.

Through Unknown Tibet. M. S. Wellby.

Volcanic Studies. T. Anderson.

Walks in New England. C. G. Whiting.

Treasurer's Report for 1903.

The receipts and payments for the year were as follows :—

RECEIPTS.	
Cash on hand, Jan. 1, 1903, unappropriated	\$442.62
“ for Eliot Memorial Fund	86.00
“ “ Mt. Washington Refuge Fund	92.06
“ “ prepayment of subscriptions and dues	44.00
	<hr/>
	\$664.68
Life Memberships, for Permanent Fund, 39 at \$30	1170.00
Permanent Fund, interest for 1903	294.61
Reserve Fund, interest for 1903	63.23
Field Meetings and Excursions, donation to the Reserve Fund	150.00
I. Y. Chubbuck, donation to the Reserve Fund	10.00
Eliot Memorial Fund, donation by member	3.68
Annual dues : 1004 members at \$3, 4 at \$4	\$3028.00
Admission fees : 219 members at \$5	1095.00
Rooms :	
Rent of keys	\$135.75
Use of rooms	6.00
Donations for rooms	8.00
	<hr/>
	149.75
APPALACHIA and other publications:	
Sales of APPALACHIA, maps, and books	\$43.42
Advertisements in APPALACHIA	236.00
Sales of Walks and Rides about Boston	119.00
	<hr/>
	398.42
Department of Topography:	
L. F. Cutter: sale of blue print maps of Northern Slopes of the Presidential Range	8.25
Donations :	
Overpayment of annual dues and Club pin . . . . .	.55
Interest on bank account for 1903	31.75
Total unappropriated receipts for 1903	<hr/>
	4711.72
	<hr/>
	\$7067.92

TREASURER'S REPORT.

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PAYMENTS.

Trustees of the Permanent Fund:

Life-Memberships, 39 at \$30 \$1170.00

Trustees of the Reserve Fund :

Interest on the Permanent Fund for 1903 \$294.61

Interest on the Reserve Fund for 1903 . 63.23

Field Meetings and Excursions :

Donation by the Committee to the Reserve Fund 150.00

Donation by member to the Reserve Fund 10.00

517.84

Eliot Memorial Fund, payment in full 100.00

Real estate :

Expenses of Trustees for 1903 \$102.51

Club subscription of 1895, last instalment, 100.00

\$202.51

Rooms :

Rent and care for 12 months \$1500.00

Electric light " " " 33.63

Fittings and supplies 63.20

Storage warehouse 23.85

1620.68

APPALACHIA and other publications :

Reprints \$20.48

Vol. X., No. 2 812.37

Delivery of APPALACHIA and Sierra

Bulletin 217.10

Business agent 50.00

Walks and Rides about Boston . . . 17.00

Edwin M. Bacon, royalty on same . . 13.60

1130.55

Stationery, Printing and Postage :

Club Register for 1903 \$240.74

General expenses 562.99

803.73

Library:

Books \$23.15

Binding and sundries 176.11

199.26

Expense of meetings 247.91

Department of Topography 14.50

Department of Exploration and Forestry 15.00

Department of Improvements 258.94

Department of Natural History 50.00

Department of Art 3.00

Clerical Services 287.00

Total expenses 4833.08

322 TRUSTEES OF PERMANENT AND RESERVE FUNDS.

Cash in bank, Dec. 31, 1903 :

Mt. Washington Refuge Fund . . .	\$92.06
Prepayments	46.00
Cash unappropriated	306.94

447.00

\$7067.92

Respectfully submitted,

RUFUS A. BULLOCK,

Treasurer.

Report of Trustees of the Permanent and Reserve Funds for the Year 1903.

PERMANENT FUND.—PRINCIPAL.

1903.

Jan. 1. Amount on hand from last report \$8198.95

Amounts received from R. A. Bullock, Treas.,

for Life Memberships :—

8 Austin P. White	\$30.00
Feb. 2 Fred D. Ilgen	30.00
6 Arthur C. Faxon	30.00
25 Miss Maude G. Hopkins	30.00
Mich. 5 Miss Frances A. Wilder	30.00
12 Ephraim Harrington	30.00
" Mrs. Ephraim Harrington	30.00
26 Frank B. Thayer	30.00
27 Charles L. Bouton	30.00
Apr. 2 Miss Mary A. Breck	30.00
13 Miss Carrie M. Williams	30.00
May 1 Thomas C. Thacher	30.00
14 Miss Mary Waterman	30.00
29 Ernest G. Buttrick	30.00
June 8 Miss Priscilla E. Alden	30.00
July 22 Stephen Carlton Rogers	30.00
11 Edward R. Olin	30.00
12 Rufus P. Williams	30.00
16 Miss L. Mabel Allen	30.00
18 John G. Hosmer	30.00
21 Frank A. Schirmer	30.00
23 Miss Henrietta J. Prescott	30.00
28 Miss Sally Viles	30.00
Nov. 4 Allston Burr	30.00
Dec. 1 Arthur H. Tucker	30.00
2 Miss Emma J. Smith	30.00
" Frederick W. Faxon	30.00
3 Thomas R. Curtis	30.00

TRUSTEES OF PERMANENT AND RESERVE FUNDS. 323

4	Sinclair Kennedy	30.00	
5	Miss A. M. Weaver	30.00	
7	William S. Eaton	30.00	
"	Miss Emeline T. Cole	30.00	
10	C. Alex. Newhall	30.00	
"	Francis Newhall	30.00	
11	Miss Ella M. Rice	30.00	
14	Miss Mabel E. Adams	30.00	
15	Mrs. Harlan P. Kelsey	30.00	
16	Mrs. Frederic Endicott	30.00	
"	Mrs. L. B. Tarlton	30.00	1170.00
Total Principal on hand Jan. 1, 1904			\$9368.95

PERMANENT FUND. — INTEREST.

1904.

Jan. 1.	Suffolk Savings Bank : 12 months, to Oct., 1903	\$39.55
"	Provident Institution for Savings : 12 months, to July, 1903	53.07
"	Lexington Savings Bank : 12 months, to Oct., 1903	39.04
"	Eliot Five Cents Savings Bank : 12 months, to Oct., 1903	32.02
"	Franklin Savings Bank : 12 months, to Aug., 1903	33.02
"	Boston Five Cents Savings Bank : 12 months, to Oct., 1903	24.17
"	Institution for Savings, Roxbury : 12 months, to Oct., 1903	35.30
"	Canton Institution for Savings : 12 months, to Oct., 1903	38.44
		<u>\$294.61</u>

1903.

Oct. 5.	Paid R. A. Bullock, Treas., as per vote of Council, accrued interest during year . . .	<u>\$294.61</u>
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PERMANENT FUND.

1903.

Dec. 31.	Total Principal on hand	\$9368.95
Deposited as follows :—		
	Suffolk Savings Bank, Book No. 100,753 . .	\$1160.35
	Provident Institution for Savings, Book No. 118,265	1556.90
	Lexington Savings Bank, Book No. 1921 . .	1145.18
	Eliot Five Cents Savings Bank, Book No. 32,233	899.92

324 TRUSTEES OF PERMANENT AND RESERVE FUNDS.

Franklin Savings Bank, Book No. 70,143 .	968.79	
Boston Five Cents Savings Bank, Book No. 425,754	995.98	
Institution for Savings, Roxbury, Book No. 80,803	1000.00	
Canton Institution for Savings, Book No. 9015	1141.83	
Warren Institution for Savings, Book No. 76,456	250.00	
North End Savings Bank, Book No. 26,345	250.00	
	<hr/>	<u>\$9368.95</u>

RESERVE FUND. — PRINCIPAL.

1903.

Jan. 1. Amount on hand from last report	\$1950.96
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RESERVE FUND. — INTEREST.

Dec. 31. Boston Five Cents Savings Bank: 12 months, to Oct., 1903	\$50.03	
Massachusetts Loan Co.: 6 months, to July, 1903	4.66	
Canton Institution for Savings: 9 months, to Oct., 1903	5.76	
Eliot Five Cents Savings Bank: 3 months, to Oct., 1903	2.78	
	<hr/>	
Interest accrued during year	63.23	
	<hr/>	
Oct. 5. Paid R. A. Bullock, Treas., as per vote of Council, accrued interest of year . . .	63.23	
	<hr/>	
Dec. 26. Received of R. A. Bullock, Treas., as per vote of Council, accrued interest of Per- manent and Reserve Funds during year .	\$357.84	
From excursion committee for the excur- sion committee	150.00	
Donation, I. Y. Chubbuck	10.00	
	<hr/>	<u>517.84</u>
Total Reserve Fund on hand Jan. 1, 1904	\$2468.80	
Deposited as follows: —		
Boston Five Cents Savings Bank, Book No. 229,173	\$1467.92	
Canton Institution for Savings, Book No. 10,793	224.64	
Eliot Five Cents Savings Bank, Book No. 46,187	776.24	
	<hr/>	<u>\$2468.80</u>

Book No. 46,187 has following entries :—

Paid-up note of Massachusetts Loan Co. . .	\$314.19
Interest to July, 1903 . .	4.66
Interest to Oct., 1903 . .	2.78
Entry Dec. 26, as above	517.84
	<hr/>
	839.47
Less accrued interest paid as per vote of Council	63.23
	<hr/>
	\$776.24
	<hr/>

1904.

Jan. 1. Total Permanent Fund	\$9368.95
“ Reserve Fund	2468.80
“ in hands of Trustees	<hr/>
	\$11,837.75

ISAAC Y. CHURBUCK,	} Trustees of the Permanent and Reserve Funds.
RENT F. CURTIS,	
CHARLES H. FRENCH,	

The Committee appointed to examine the accounts of the Appalachian Mountain Club respectfully report that they have examined the account of the Treasurer for the year 1903, and believe the same to be correct. Proper vouchers were shown for all payments, cash on hand verified, the same amounting to \$447.00.

We have also examined the accounts of the Trustees of the Permanent and Reserve Funds, and find them to be correct. The Permanent Fund shows a balance of \$9368.75, and the Reserve Fund amounts to \$2468.80.

Investments as reported by the Trustees have been verified.

JOHN E. ALDEN,	} Auditing Committee.
ALBERT E. DUFFILL,	
FREDERIC W. STONE,	

Boston, January 8, 1904.

Report of the Trustees of Real Estate for 1903.

No new work has been done upon the Lead Mine Bridge, the Snyder Brook, the Madison Spring, the Farrar, the Clay, the Carlisle Pines, and the Parsons Reservations, other than to look after the trees and shrubs, the buildings, the paths, and the signs. In addition to the usual cloth notices, neat and appropriate wooden signs, by permission of the Selectmen of Carlisle, have been put upon the roadsides giving directions how to go to the Carlisle Pines Reservation. Mr. Theodore F. Borst, the Forester of the Massachusetts Forestry Association, has made for us a preliminary examination of this Reservation, and advises that it be surrounded by a fire guard at least thirty feet

wide, that footpaths four or five feet wide be cut and graded, and that the overtopping hardwoods be removed so as to permit the growth of the young pines; and he kindly offers to help us in this work.

New cloth notices have been put upon the buildings on the Farrar and the Clay Reservations. The danger of serious injury to the paths from the Snyder Brook Reservation and to the attractiveness of this whole region, by the lumbering operations referred to last year, continues; but, fortunately, public opinion in New Hampshire upon the value of the forests has greatly changed, and this year there has been a survey by the United States Forestry Department, at the expense of the State of New Hampshire, of the Presidential Range and adjoining territory, with a view to the possible establishment of a National Reservation.

The Club is under great obligation to Mr. E. G. Chamberlain, who, at our request, gave two weeks of his time, without any compensation therefor, to the mapping of the Joseph Story Fay Reservation. It was hard work, without the assistance of plans or distances along the boundaries; and the extreme wildness of much of the territory and the numerous obstacles made even walking around it, many times crawling or climbing, very slow. Mr. Chamberlain, however, is a man of remarkable patience and perseverance, and, notwithstanding the great difficulty of work, has given us an accurate and useful map, 200 feet to the inch, with roads, brooks, boulders, and trees marked thereon, and with contour lines approximating ten-foot intervals.

A second light rustic bridge, made of two long and large logs floored over with split fagots, and with a handrail of small tree trunks, has been built to the island. To avoid danger from floods, the logs and the abutments upon which they rest have been bolted down to boulders buried in the banks. Steps hewn out of logs are at the ends of the bridge. The views upon this little stream are so pretty that the local storekeepers find quite a business in the sale of photographs.

The report of the committee in charge of Three Mile Island and the Camp indicates increasing improvements. During the year the water system was completed, including the installation of an eight-inch Ericsson engine. Some \$185 were spent in

blasting and moving rocks which were a menace to boats and canoes. The wharf was extended to the south and given an additional frontage of forty feet. The camp building was enlarged by adding a space for dining-tables, a large kitchen, ice-house, refrigerator, wood-shed, and five chambers. The total insurance upon buildings and contents now amounts to \$3700. The Camp owns sixteen tents and twenty-six tent-floors. One hundred and eighty-eight persons visited the camp during the year.

The holdings of the Club in New Hampshire have been increased during the year by gift from Miss Mary Lee Ware, a distinguished patron of botany, of about 800 acres of land in the town of Fitzwilliam. Upon this land are a farm house and two barns, an abandoned silica mine, an excellent spring, and the largest known natural bed of *Rhododendron maximum* in New England. The rhododendrons, and the pine woods in the immediate vicinity thereof, are to be held as a reservation, but the remaining land we are at liberty to sell. We have spent a little over a hundred dollars in the clearing up of tree tops and brush and in the burning of them so as to lessen the danger from fire. About three hundred dollars must be spent upon the house and barns, if we are to have some one to reside upon the property for the protection of the rhododendrons.

Another evidence of the growing interest of the people of New Hampshire in their forests and of their appreciation of the benefit to the community from our holdings is found in the passage by the Legislature of an act freeing what we then held from taxation. Hon. John M. Mitchell of Concord, without compensation, took charge for us of the bill; and to his kindness and skill we are indebted for its success. Our gratitude is due also to many other friends, both in the Legislature and without, for their generous support.

We hope to issue early in the year an illustrated pamphlet descriptive of the Reservations, and giving their locations and ways of approach.

In closing we again urge upon the attention of all who are interested in our work that the Trustees need and will gratefully receive and acknowledge subscriptions, large or small, to enable us to care for and improve our Reservations.

Respectfully submitted, for the Trustees,

HARVEY N. SHEPARD, *Chairman.*

Reports of the Councillors for the Autumn of 1903.**Topography.****BY FREDERIC V. FULLER.**

A FEW lines suffice for the report of the Councillor of Topography for 1903, as but little new work has been attempted. Measurements and sketches have been made of the paths at Three Mile Island, and these will soon be placed upon the map made by my predecessor, Mr. Endicott. On account of the pressure of other work, the Councillor was unable to make a plan of the Joseph Story Fay Reservation at North Woodstock for the Trustees of Real Estate, and suggested that they secure the services of Mr. E. G. Chamberlain; the excellent topographical map on a scale of 200 feet to an inch, now in the hands of the Trustees, shows how thoroughly and sympathetically this work was performed by him. In a recent summary forwarded to the Councillor, Mr. Chamberlain says: "From January 1st to October 31st, 1903, I made pacing traverses of twenty-one outings, blue-printed them uniform with those of previous years, and distributed them as souvenirs. I have made panoramic views (blue-printed as usual) from Castle Hill in Saugus, Bald Pate in Georgetown, Chickatawbut Hill in Milton, and from a point opposite the Club's Reservation in North Woodstock, N. H."

Your Councillor hopes to arrange for the production of a series of sketch maps, showing quite definitely how any one can take half-day or all-day outings through the large Metropolitan Reservations, and cover in each case the most interesting and varied features of certain sections. As yet, however, but little has been accomplished, except to bring the matter before the Metropolitan Park Commission, through its Secretary, Mr. John Woodbury, to see if its coöperation can be secured.

Reports of the Councillors for the Autumn of 1903.**Natural History.****BY HARLAN P. KELSEY.**

THE most important work in this Department has been on the check list of the native flora of Three Mile Island, and

arranging, identifying, and mounting the specimens previously collected, thus making a fair start towards what is hoped will eventually become a complete herbarium of the flowering plants of the island, to take its place with the already fine herbarium of Californian and other native ferns, Jamaica ferns, and flowering plants, now the property of the Club.

The prepared sheets number 84, showing 160 specimens, in species and varieties. It is only a small beginning, and it is very desirable to add to the collection the mosses and fungi of that locality and to complete the collection of flowering plants, ferns, and especially the grasses and carices. This herbarium will be placed in the Club rooms for the use of the members of the Club for reference, or may possibly be temporarily removed to the clubhouse on the island for comparison in making further collections during the summer months, as may seem best.

A check list of plants noted by the Councillor and other botanist members of the Club is made a part of this report, and will serve as a foundation for a complete list, which can only be made after most exhaustive and painstaking botanizing during all the growing months of the year. When such a final check list is available for reference, it will be invaluable not only to the Club, but to outsiders interested in local floras. Every member who visits the island and is botanically inclined can aid materially in this work by reporting all species of plants noted by them that are not on this check list. The list is at present so incomplete that it is believed that more than twice the number of species and varieties can readily be added to it, even without exhaustive research.

Mr. A. S. Pease, a member of the Club, reports the very interesting discovery of a second station for the extremely rare *Cypripedium arietinum* or Ram's-head Lady Slipper. He also reported other plants. Miss M. A. Coe made a collection of fungi.

The rare plants on the island should be carefully protected and preserved, as some are shy and may easily disappear altogether. Some work has been done for those in charge of the Island to protect camp sites by screen plantings of pines brought from the mainland and transplanted with success. The rhododendrons and other wild plants and vines planted in 1901 and

1902, mentioned in previous reports, have for the most part lived and are firmly established, and will add increasing interest and beauty as they develop. The Councillor would again urge members and their friends visiting the camp to carefully protect the native growth in every way, and not to cut or destroy trees or plants or pick flowers without the express permission of the Trustees of Real Estate or those representing them in charge.

The valuable collection of pressed ferns and other specimens above referred to, which was presented to the Club several years ago, has been examined and found to be in excellent condition, being packed in nineteen neat tin boxes. These boxes are not, however, entirely insect proof, and it might be well to have them made so sometime in the future.

There should also be a regular herbarium Club label for use on the specimen sheets. The nomenclature should be carefully revised, species and varieties determined, and a reliable check list of the collection published, making it more available for practical use and study than at present.

One bird exhibition was held at the Club rooms, April 13 and 16, by Mr. W. R. Davis, when 160 New England birds were shown, including warblers, sparrows, finches and shore birds.

A list of birds seen or heard on or near Three Mile Island during 1901 has been posted in the Club house two seasons for additions, and it is regrettable that only six new names have been noted by members, as below, making the total number observed to date 32. According to one member who is good authority, this is less than one half the species that may reasonably be expected to visit the island during the year.

NAME.	SEEN.	PLACE.	BY
Sandpiper	June 14, 1902	Hawk's Island	N. A. L.
Cedar Bird	June 14, 1902	Three Mile Island	N. A. L.
King Bird	Aug. 3, 1902	" " "	W. R. D.
Hairy Woodpecker . . .	Aug. 3, 1902	" " "	" " "
Eagle	May 31, 1903	" " "	No authority
Black and White Creeper	Aug., 1903	" " "	" " "

The suggestions as to studying and reporting the plants found on this interesting forty-two acres of island apply as well in the case of the birds, — and, I might add, of the insects and other

animal life; so that, in time, complete check lists of the fauna as well as the flora might be published.

In conclusion the Councillor would suggest that Natural History might well be cultivated by our members by studying and making local lists of the birds, flowers, and animals seen on the many different excursions taken during the year, and particularly the Saturday afternoon walking parties. Special bird, botanical, or geological trips might be arranged with a competent leader in charge (and there are many such in the Club), and regularly advertised in the monthly announcement that reaches all members, thus adding interest and pleasure to the excursions, and giving new objects to entice us to an outdoor life of fresh air and a healthy and profitable exercise, both of mind and body.

Reports of the Councillors for the Autumn of 1903.

Art.

BY L. LOUISE TARELTON.

SINCE the annual meeting in January, the Club has received in its Art Department several gifts from its members.

A large water-color painting of Monte Rosa and the Gorner Glacier has been received from the artist, Miss Agnes Leavitt. Mr. William H. Peck has given us seventeen water-colors of the Presidential range, painted by him in 1886, during the field-meeting of the Club at the Summit House, Mt. Washington. A photograph of the lower end of Rangeley Lake was received from Miss Isabel Batchelder, and six small colored prints of Vesuvius in eruption were given by Mr. Henry P. Curtis. An interesting old engraving of Mt. Washington, taken from Conway meadows in 1851, was given by Mr. Ritchie.

The exhibition at the Annual Reception at the Vendome on February 6 was the first and largest of the year. Miss Leavitt kindly loaned us a large number of her water-color paintings of New England scenery, which were much enjoyed. A unique collection was that loaned by Mr. Russell W. Porter, who was the artist of a recent Arctic expedition. The pictures, some forty in number, were sketches in water-colors, pastel, and pencil,

and were most interesting, as giving an idea of life and scenery in the Arctic region. Miss Sara A. Stone loaned us two of her water-color views, and Mr. Charles M. Cox five from his collection, so that we were able to exhibit quite a large number in color by artists of our Club. Miss Pollock again kindly allowed us to show some of the polychromes of the Rocky Mountains and Switzerland, which we had before seen at the Club Room; and photographs were shown by Messrs. French, Endicott, Homer, and Rogers. Eighteen very beautiful monotypes of natural scenery were loaned us by Mr. Robinson.

On March 22 the photographs taken on the snow-shoe trip were exhibited at a reunion of the party, and remained on exhibition for a week.

The Room Committee were "at home" on April 21. The large collection of photographs of the Selkirks and the Canadian Rockies, taken by Mr. Herbert W. Gleason, were loaned to us for exhibition on this occasion. For two weeks in the month of November, some very beautiful photographs of the Canadian Rockies, taken by Mr. Henry G. Peabody, have been on exhibition at the Club room, a large panorama from Mt. Abbott and a view of Mt. Assiniboine being especially fine.

The smaller set of Sella photographs, which have recently been labelled, have been loaned but once during the year, to the Amherst Mountain Club. The remainder of the Sella photographs are being labelled.

Reports of the Councillors for the Autumn of '1903.

Exploration and Forestry.

BY ALLEN CHAMBERLAIN.

IN presenting this his third and final annual report, the present Councillor desires to express his regret that so little original work has been produced by him. In fact, so far as exploration is concerned, he has been little more than a custodian of the scientific instruments and field equipment belonging to the Department. As to the other division of the Department, that of forestry, an effort has been made to keep the Club in touch with every movement affecting the forestal conditions of Massa-

chusetts and New Hampshire, and to lend thereto such support as seemed consistent with the Club's interests. And yet, as regards mountain exploration in the remoter parts of the globe and first ascents, this has been the most notable year in the Club's history. In the northwestern Himalayas, one of our corresponding members, Mrs. Workman, in company with her husband, has explored the hitherto unvisited Chogo-Loongma glacier, and attained the highest altitude yet reached by woman. The enterprise of another of our lady members, Miss Peck, led her to attempt the highest of Andean peaks, the still unconquered Sorata, though adverse conditions prevented the chance of success. A brilliant series of successes was scored in the Canadian Rockies. Four of the most inaccessible peaks, though the base of no one of them is beyond a single day's journey from the railway, Mts. Goodsir, Hungabee, Deltaform and Biddle (names so often recurring in the pages of APPALACHIA !) were successfully scaled by our fellow-member, Professor H. C. Parker. Professor C. E. Fay, one of the party that so nearly accomplished the ascent of Mt. Goodsir in 1901, accompanied him in the ascent of that peak and later added Mt. Daly, on the Continental Divide, to his personal list of "firsts," visited the glacier sources and head of the great Takakkaw Fall, and explored a new pass between Mt. Stephen and Cathedral Mountain. The fine peak at the head of Consolation Valley, indicated as "Mt. Fay" in the latest maps of the Dominion Topographical Survey, was secured by Mr. Charles S. Thompson.

As recommended in the last report of this Department, all the instruments in the Councillor's care (for complete list see last year's report) were thoroughly tested and adjusted by a competent instrument-maker before the field season opened. No additions have been made to the equipment this year.

A part of the Councillor's effort has been as an ex-officio member of the Trustees of Real Estate ; reference is therefore respectfully made to the report of that board.

During the absence of the Councillor last winter, a special committee was appointed by the Council to prepare a list of Club paths and camps, including information of use to persons intending to use them. Such material is likely to prove valuable to our members, and might well be extended from year to

year. It is suggested that this might be brought about by the collaboration of the departments of Improvements and of Exploration and Forestry. Brief but practical memoranda are what are needed, — facts as to distances between certain well-established and permanent landmarks, altitudes of these marks, and the average time required to make a given trip. Such information should not be confined to the Club's paths, however, but should be extended, season by season, to include all the important trails in the White Mountain region at least. Main distances the walker can figure out for himself with the aid of a good map, and an experienced mountaineer and woodsman can estimate the time which will probably be required to cover the ground. Not all our members are experienced in such matters, but all might become so if encouraged by such information to strike out and make a trial trip. Lest this should be interpreted as encouraging the inexperienced to take chances, it should be added that the beginner should use the utmost caution, and study his woodcraft by degrees. Such material as is here suggested could be collected by members and sent in to the Councillors, who could arrange it for future publication. Already data of eleven such trips have been collated by this Department.

Judging by the interest displayed in the two meetings held by the Club last spring, when the hygiene and equipment of mountain tramping and camping were discussed, and by the increasing interest shown in the Club's annual walking party, the Councillor is led to believe that special meetings might be called by this Department from time to time for the further discussion of these matters. Opportunity would thus be afforded old trampers and beginners to compare notes and exhibit kits. The present Councillor has been unable to call such a meeting, but he has made inquiry at camps and field meetings to determine more fully the amount of interest in the subject, and has thereby been led to believe that the subject should be taken up officially. Meanwhile he has gathered considerable interesting material from expert sources touching outfits and available foods for campers-out.

In the field of forestry the Club has taken no prominent action the past year. An effort was made by the Massachusetts

Forestry Association last winter to have the Commonwealth establish a division of forestry with a competent forest engineer in charge. This was unsuccessful, but there is every reason to expect that it will be carried through in 1904. This is a matter in which the Club will naturally be interested, and under certain conditions might well take an active part in securing. The State should be prepared to carry on within its territory the programme begun by the federal department of agriculture in 1898, of furnishing free advice to farmers in the scientific management of woodlots, and the utilization of waste lands for forestry. For this work a State forester is needed.

In the matter of the proposed White Mountain forest reserve, which Congress is to be asked to provide at the expense of the nation, no official action has been taken by the Club. The Councillor has attended meetings of those in interest, and has closely followed the progress of events from the outset. In his judgment a federal forest reservation in that section is essential to the best interests of New England at large, but whether this Club should take an active part in the effort to secure the necessary legislation is a nice matter of policy for the Club and its Council to determine.

Within the past month this subject has been further complicated by the vigorous campaign being conducted all over the Union by Californians in favor of federal action to save the so-called "Big Trees" of that State. This matter has been before Congress since early in 1900, and was the subject of an interesting report to Congress by the Department of Agriculture.

An effort will doubtless be made to move these two matters along together with the bill for the Southern Appalachian reserve.

Meantime, the State of New Hampshire has supplied \$5000 with which to defray the cost of a careful and scientific examination of the territory which it is desired to include within the White Mountain reserve, and the federal Forestry Bureau has carried out this work during the past summer. The New Hampshire Forestry Commission and the Society for the Protection of New Hampshire Forests are chiefly responsible for this effort, and are to be relied upon to push the subject vigorously.

Reports of the Councillors for the Autumn of 1903.

Improvements.

BY JAMES STURGIS PRAY.

IN his last report the present Councillor stated at some length what he believed should be the future policy of the Department, and advocated the gradual development and subsequent maintenance of a system of interrelated main paths connecting local centres, — the maintenance of purely local paths to be left to local organizations interested. Something has already been accomplished toward this end, and the way prepared for achieving much more in 1904. It should, however, be borne in mind that many of the fruits of our scheme can be realized only when we have advanced much farther toward its completion.

The total expenditures in this Department for 1903 have amounted to \$258.95. In 1904 the Councillor believes that \$300.00 may well be devoted to advancing the work of the Department.

None of the paths on MADISON, ADAMS, and JEFFERSON were seriously injured by logging in the winter of 1902-03, except the Castellated Ridge path, which was so blocked up that it seemed best not to attempt to clear it, at least until conditions should be more settled. All except the Cascade-Ravine trail — now considerably disturbed in its lower part by logging — were cleared early in the season. In view of the likelihood of continued logging in this region, the Councillor recommends reducing expenditures on these paths next season to what may be absolutely necessary for the proper maintenance of the more important main lines.

Of the paths on the RANDOLPH MOUNTAINS, that to the Pond of Safety has been cleared ; the Ice Gulch path has required no attention. Both these paths are purely local in character, and arrangements should as soon as possible be made for their local maintenance without expense to the Club.

The Glen-Carter-Notch and CARTER-MORIAH paths were cleared early and with unusual thoroughness. Despite the fire that swept the Dome a few weeks later, the path was reported

all right at the end of the season. The tripod, however, which had been there set up was destroyed. The Councillor has received a request from Mr. J. Rayner Edmands to have the summit prepared for the erection of a stone tower, — the expense to be met by himself, and others whom he represented. It proved impossible to get any one to do the work this fall; so that the project lies over until spring.

The Wildcat path cut out in 1901, and later formally adopted as a Club path, has required no work this season.

The Jackson-Carter-Notch path, on which, owing to logging, nothing had been done for a number of years, was partly swept by fire early in the season, very considerably facilitating the work of reopening. The ground was looked over by the Councillor and the matter of reopening left in the hands of Mr. James P. Stow, who at a cost of fifteen dollars cleared the path through to the site of the old camp, and put up signs supplied by the Department. The work of the fire has led to a considerable straightening of the path and keeping it well up on grade, where before it descended to the brook and climbed again to Cold Spring. This restores the system of paths from the Glen and Jackson through to the summit of Moriah, from which point to Gorham the path is well maintained locally.

Nothing has been done this year toward repairing the present camp on Imp, it still seeming desirable to rebuild in a somewhat different location. The work should be done next season.

The rebuilding of the Club camp in Carter Notch has occasioned more controversy than any other project of the Department this year. Some strongly favored rebuilding an open camp on or near the old site; many others have strenuously demanded a closed one in a new situation, naming as the best place a point about one third the way up the wooded slope northerly from the pond. While strongly favoring open camps, as a rule, the Councillor has felt that in this case a closed one might be less smoky, and would be more economical of fuel, thus tending to conserve the beauty of the surroundings, besides meeting the strong local demand for a camp available in late fall and winter.

Toward the close of the season Mr. Stow agreed to build, at a cost of eighty dollars, on the site chosen, a closed camp according to plans to be approved by the Councillor. The Club was to be

at no expense for first construction or for maintenance, although the camp should remain always under the control of this Department, — the only condition being that the Club should acquire at once the right to build, in order that the camp might be ready for the hunting season. The Councillor applied to the owners, the Hastings Lumber Company of Hastings, Maine, but was courteously informed that the Company had decided to grant no permits for camps within their territory, because of the increased fire risk. Mr. Warren W. Hart now undertook to use his influence in behalf of the Club, and has forwarded a letter from President Haskell which states that the Company, although it has felt compelled to decline several applications from others to locate camps on its property, has concluded to grant us the desired permit. It is understood that the Club will take all possible steps to build and maintain a proper camp with a view to conserving the Company's large property interests in that section, and that to this end the camp shall be a closed one. The question of site has been left open, except that it is understood that it must be near the lakes. In the spring, therefore, the Club may well avail itself of this special concession, due entirely to the good offices of Mr. Hart.

Of the paths and camps on Mt. WASHINGTON, the Tuckerman's Ravine path was cleared early in the season and was later inspected by the Councillor, who put up additional signs; but the bridge which was to have been built across Cutler's River, below Crystal Cascade, was not built. It should, however, be constructed the first thing in the spring of 1904, and in a way to withstand all ordinary freshets.

This Club path technically stops at its junction with the Raymond path from the Mt. Washington carriage-road. Never, so far as known to the Councillor, has the Club held itself responsible for the maintenance of the path which leads from this junction to the summit of Washington, — the continuation of a path from the Mt. Washington carriage road built and long maintained by the late Curtis B. Raymond, and familiarly known as the Raymond Path. This path as far as Bigelow's Lawn was inspected by the Councillor in July, and found in very bad condition. He therefore ventured to place himself

in correspondence with Mrs. Raymond, recommending the outlay of fifteen dollars or more to repair the path, and volunteered his services in directing the work. His offer was accepted, and the necessary work was begun, but unfortunately not completed throughout. In the upper ravine, however, where the freshets had rendered the path dangerously blind, it has been made clear by cutting and by cairns; and the paint above the rim of the ravine has been renewed to the height of land on Bigelow's Lawn, whence it is to be continued next season to the summit. The rocks below the rim have also been painted so that the splashes are practically continuous with the cairns extended up from below; but these splashes are invisible from the floor of the ravine. Numerous special signs, also, made at Mrs. Raymond's expense, are in readiness to put up next season as soon as the path has been repaired through the logged area near the Mt. Washington carriage-road. Being unable to attend in person to this work, the Councillor was represented by Dr. Frederick Tuckerman and Mr. A. B. Hubbard, who, together with W. Kittredge, whom they employed, put in much hard labor. When next season the whole path will have been restored, the Councillor believes that some proper provision should be made for its future maintenance, since it is one of the most popular, and certainly one of the most beautiful of all White Mountain paths.

The Boott Spur Trail is now in good condition, a considerable number of cairns having been added this year between those already built, rendering the path safer in thick weather.

Hermit Lake Camp was inspected and repaired early in the season, and on August 1 the Councillor found it in good condition. It is much used, and on the whole seems to have been subject to less abuse this season than heretofore.

The Mount Washington Refuge was inspected and repaired early in the season, in connection with Tuckerman's Ravine Path, a storm cleat being placed at the bottom of the door to keep out water. The latest report (October 14) was favorable, excepting that two of the blankets had disappeared. It seems that they had been taken by boys going over the Crawford Path, and were afterwards recovered and brought back as far as the Summit House.

Of the paths in the SACO VALLEYS the one up North Moat from Diana's Baths requires remarkably little annual outlay. This year it has required none at all. Its extension, however, along the ridge to the summit of South Moat, which was made last year, was found by the Councillor to be very blind in places, as well as the path down from the summit of South Moat to the Albany Road. Both have been put in thorough repair at a cost of four dollars to the Club, numerous cairns being added along the ridge and signs where needed here and on the descent. It forms an exceedingly beautiful walk. A possible further extension northward to the summit of Attitash (to which a good path from the Bartlett Road was almost completed this season) is under consideration. Such an extension, if feasible, will make more direct the southern approach from the Tamworth-Albany region to the Crawford Notch and Presidential range.

The Mount Carrigain Path was put in such good order last year that nothing has needed to be done to it beyond adding a few signs near Camp 5, where the unusual June freshets had rendered it obscure. The Councillor feels the desirability of a path, to be maintained by the Club, through the Carrigain Notch from Livermore to some point on the East Branch, connecting with other important paths and trails existing and proposed in that region. He has in mind also to investigate next season the feasibility of a new ridge trail in the other direction from the summit of Carrigain over Hancock and Hitchcock and thence by a good existing logging road to its junction with the Swift River Trail extension, to be referred to farther on in this report.

The Mount Willey Path, which will always be a rough and steep one, and upon which nothing had been done for a number of years, has been greatly improved, especially in its upper part, by additional signs and some bushing out and respotting.

The Swift River Trail, which since the last report has been formally added to the Club's schedule, has been put in excellent repair at a cost to the Club of two dollars. Signs have been added and others relocated. Its extension, proposed last year, has been accomplished, and the way has been cleared and well marked from Camp 6 over the divide between Huntington and Kancamagus down to the bed of Henry's old logging railroad.

Between the Camp and the foot of the steep slope, the path makes twelve crossings of the Swift River and its tributary streams; but in the summer and autumn these crossings ordinarily present no special difficulty, and by their variety and frequent recurrence they add greatly to the interest and beauty of the walk.

The total length of path added by this extension is estimated roughly at five miles, and the work had all been done before August first at a cost to the Club of only eight dollars. The Councillor has set up temporary landmarks along the Henry loop which connects the end of this extension with the end of the old path leading in to Greeley Ponds, a distance of about one mile, and next year this connection will be made clear with path signs. Through connection with the Henry system of logging roads and railroad lines the way is now clear from Albany to Lincoln and North Woodstock.

The Twin Mountain Path and Trail, among those in the FRANCONIA region, has had nothing done on it this season, and is reported blind where it leaves the Little River Lumber Railroad, and also just south of the summit of Guyot and southward from Bond; so that, although this is intended to be for the most part no more than a rough trail, something should be done next season to make it perfectly clear and unmistakable throughout.

No work was done on the "New Mount Liberty Path," and it is reported somewhat out of repair. The North Woodstock Improvement Association, however, have cut a path from the Flume beyond the bridge up the west face of the mountain to the summit, about where the old Mount Liberty path ran, and their maintenance of this would seem to make it even more unnecessary for the Club to maintain the other path, both really being local paths. On the other hand, the Councillor has been in correspondence with Professor H. W. Tyler and Professor K. P. Harrington, members of the North Woodstock Improvement Association, and has agreed that if the present ridge path from the summit of Lafayette to the summit of Liberty shall be extended next year by said association on to the summit of Flume Mountain, and down over Whaleback and Big or Little Coolidge to Lincoln or North Woodstock, he will recommend

its adoption and maintenance thereafter as a Club path. The Association plans to do this work, and if this ridge trail is adopted by the Club it will certainly constitute a most important additional trunk line and mark a real advance toward the completion of our system.

The Councillor's recommendation in his 1902 report, that this ridge path should be extended northeastward from the summit of Lafayette to the summit of Garfield, has not been carried out, but probably can be next year. In connection with the important southward extension just referred to, a path up Mount Garfield, probably from the railroad below Bethlehem Junction, will be a most important link in this ridge walk.

Concerning paths in WATERVILLE I have to report that at the beginning of the season the American Institute of Instruction Path was in very bad condition on account of logging in Waterville, and a blow-down on the eastern side. No work had been done on the path for a number of years because of the uncertain prospects, but the whole path — from Mrs. Elliott's to the height of land — has now been, under direction of the Councillor and partly at Mrs. Elliott's expense, thoroughly cleared of windfalls, bushed out, and made unmistakable by path signs; while from Camp 6 it has been similarly cleared and marked to and through the blow-down on the eastern edge of the plateau.

The Sandwich Dome or Black Mountain Path from Waterville was cleared early, as usual, under direction of Mrs. Elliott, and reported in good condition by the McCrillis parties in August. This, like the preceding, will probably require little if any work next year.

On PASSACONAWAY the Loop has been cleared under direction of Mrs. Walden, and will require little if any work in 1904. Passaconaway Lodge is also believed to be in good condition, and has required no outlay.

The general care of the MADISON SPRING HUT during the season has been in the hands of the Lowes, who in the spring had certain of the bunks freshly boughed, all the blankets washed, and such repairs made as were needed. Three new

double blankets have been added to replace old ones outworn, as well as certain needed utensils. No complaints as to the condition of the Hut have been received, and no reports of overcrowding, — due in part, no doubt, to the wide circulation and posting at the hotels of the region of printed copies of my predecessor's regulations.

RECORD CYLINDERS AND ROLLS: Full rolls have been returned from Adams, Jefferson, Pleasant, Hermit Lake Camp, Carter Dome, Osceola, Sandwich Dome, North Moat, Passaconaway, and Paugus, and new ones have been placed upon Adams, Carter Dome, Pleasant, Sandwich Dome, North Moat, and at Hermit Lake Camp. Cylinders have been reported missing from Anderson, Madison, and Wildcat, and no opportunities have yet offered for replacing them. The one missing from North Moat has, however, been replaced. Cylinders with fresh rolls have been placed this season, it is believed for the first time, upon the following summits: Isolation, Giant's Stairs, Resolution, Attitash, South Baldface, Hitchcock, Huntington Summit, Huntington western outlook, and South Moat.

The Department has lent its aid, in accordance with the policy outlined last year, in locating, repairing, and defining other than Club paths. Besides its assistance to the Raymond Path, it has contributed to repairing the Champney Falls Path up Chocorua and the Bolles Trail, and supplied signs for the path reopened this year to Tuckerman's Falls on Beaver Brook.

A further word should now be said as to the Department's main line policy. The complete development of the scheme expounded in last year's report of organizing a system of main paths will probably involve the permanent maintenance of a certain number of paths not main ones, in no strict sense "through lines," but branches thereof which are likely to be always outside the spheres of influence of local organizations. The tendency to keep the number of these unduly great must be recognized and guarded against, however, and only those branches should be on the Club's schedule which are not to be otherwise maintained and which truly extend the usefulness of the trunk lines by rendering accessible from them points of special interest.

Among such branches, paths leading to summits from valley lines will always form a most important class. Such are the Wildcat Path and the Boott Spur Trail. Certain others like the King's Ravine Branch of the Air Line and the Air Line Branch to the Madison Spring Hut are essential as connecting links, and often, as in the case of these two, mean very little to maintain. Indeed, the latter class being cut through scrub which is of exceedingly slow growth, and being washed under foot, so that there is very scanty soil left for new growth, practically maintains itself. Certain paths which are now quite detached and have no organic relation to the system, such as the Mount Carrigain Path and the Mount Willey Path, will perhaps some day become parts of main lines over their respective ranges, as the path up North Moat has recently become part of such a main line. In general, however, the detached paths and even the branch paths will be more likely to receive maintenance from outside in whole or in part, if the Club's much more important main lines are once recognized as well established and found to be well maintained.

In conclusion, it should now be said that the correspondence of the Department has been even greater this year than last, and the coöperation of Club members and others more widespread and helpful. The Councillor desires to express his sincere appreciation of all this kind assistance in his work.

Report of the Excursion Committee for 1903.

DURING the year the Excursion Committee maintained a formal organization, with meetings every month during the excursion season and full attendance save at one meeting. It arranged and carried out eight Excursions, with 576 persons participating, an average of 72. It also planned for 50 Outings, the matter being under the care of a sub-committee consisting of Messrs. Ritchie, Newcomb, Rogers, and Perkins. Unfavorable weather prevented the starting of six of the Outings, the remaining 44 being attended by 2527 participants, an average of 57. The total attendance on the Outings and Excursions was 3103.

EXCURSIONS.

The Winter Excursion, February 11 to 24, was planned and carried out by the officers of the Snow-shoe Section, Messrs. W. R. Davis and R. B. Lawrence. The Iron Mountain House in JACKSON was for the fifth time the

headquarters of the Club. The programme was much the same as in former years. There were 121 in attendance.

The regular Decoration Day Excursion had for its field of operations the minor peaks of the MONADNOCK GROUP of mountains in New Hampshire. The party, numbering 44 persons, left Boston on Friday, May 29, for South Lyndeboro, having for its headquarters "The Pinnacle," on the side of Lyndeboro Mountain. The place was an excellent selection, abounding as it does in the less exacting climbs. On Friday afternoon the entire party ascended to both peaks of Lyndeboro Pinnacle; on Saturday the objective point was Crotched Mountain; on Sunday there were informal rambles to Winn and other near-by peaks, one party going by carriage and climbing Joe English, and on Monday both summits of Pack Monadnock and the Farrar Reservation of the Club were visited. Mr. Edward Moffette was in charge.

The Thirty-seventh Field Meeting of the Club was held, after many years' absence, at INTERVALE, N. H., with headquarters at the Intervale House, 58 persons in attendance. The party assembled there on Saturday, June 27. On Sunday afternoon an informal stroll was taken through the Cathedral Woods and to the top of Hurricane, 11 members participating. On Monday there was an all-day party to Kearsarge (17 persons); on Tuesday the main party went to the summit of Mt. Washington, 20 in all, of whom 12 returned by the Crawford bridle path to Crawford's and 3 by the Mont Alban trail to Bemis. On Wednesday a morning party visited the ledges in company with Professor Barton, President of the Club, who spoke on matters of geological interest, and in the afternoon Mt. Surprise was visited. On Thursday, 17 made the ascent of Moat, 5 of whom visited all the summits in the range; all descended by Red Ridge. On Friday, 33 took carriages for Madison Boulder, lunching *en route* at the Chocorus House, and on Saturday 42 went by train to Livermore, 15 reaching the summit of Mt. Carrigain.

The literary portion of the meeting covered two evenings, Monday and Thursday. Especial mention should be made of the courtesy and attention of Mr. Mudgett of the Intervale House, who used every effort to make the stay of the Club pleasant to its members. The committee in charge of the field meeting consisted of John Ritchie, Jr., Edward Little Rogers, and Harland A. Perkins.

The site chosen for the August Camp was at WHITEFACE INTERVALE, N. H., in the margin of the woods near the farm house of Mr. Alonzo McCrillis. It was the place which had been used for a previous camp of the Club, the location being an ideal one, with delightful views and cool breezes. The party left Boston on the morning of Saturday, August 1, for Weirs and Centre Harbor, receiving additions at this place from the camp at Three Mile Island. The total enrollment was 26.

Sunday, an afternoon walk was taken to Red Ledge near Wonalancet. On Monday nearly every one made the ascent of Whiteface by the McCrillis path, returning by the Blueberry Ledge path. Tuesday, a party ascended Passaconaway via Dicey's Mills, reaching the camp in a drizzle. A lean-to was hastily constructed, which, with the Lodge, served to shelter the company through the night. On Wednesday the return was made in the rain to camp. Thursday was rainy. On Friday the entire party went by hayrack to Diamond Ledge, where it was entertained by Miss Foster. Saturday was devoted to Chocorua, the ascent being made by the Brook Path. Spending the night at the Chocorua Peak House, the party descended on Sunday afternoon to Shackford's by the Sturgis Pray trail, encountering rain later in the afternoon. A few returned direct from Chocorua to camp. On Monday the Shackford group returned by the Square Ledge trail, those who were in camp ascending Whiteface and spending Monday night in Camp Shebadi. On Wednesday a party of eight, four men and four women, climbed Whiteface, crossed to Tripyramid by the Rich and Sleeper trails, thence over middle Tripyramid and the north peak, and by the north slide to Waterville, returning to camp on Thursday over Sandwich Dome, on the summit of which they met the rest of the company which had come up that morning from camp. Friday was spent in short tramps in the Whiteface region, and on Saturday the party returned to Centre Harbor, a dozen or more stopping at Three Mile Island over Sunday. The Excursion was under the care of Mr. Harland A. Perkins.

The Labor Day Excursion was to BRIDGTON, ME., near Highland Lake, the party numbering 69. The members left Boston, Friday morning, September 4, by the way of Portland and the Songo River, the headquarters of the Club being "The Bridgton." On Saturday morning 43 persons walked or drove to Mt. Henry, and in the afternoon 52 drove to Sweden and around Highland Lake. Sunday was spent in a variety of ways, some going to church and others to Wyonegonic Camp and Sunset Rock. On Monday 18 persons made the tour of Highland Lake in the launch in the morning, and in the afternoon 49 drove to Waterford Flats. The party returned to Boston on Tuesday. Mr. Edward Little Rogers was in charge.

The WALKING PARTY assembled at the Pemigewasset House, Plymouth, N. H., on Thursday, September 3, 11 in number. On Friday morning the line of march was taken up by highway to Rumney, stopping for a while at the ice caves and arriving in time for dinner. In the afternoon most of the walkers made the ascent of Rattlesnake. There was a tremendous thunder shower during the night, this and a shower or two on Saturday being the only rain during the two weeks of the trip. On Saturday the walk was by the highway to Stinson Lake, where a brief call was made on ex-president Herbert, thence to Glen Ponds and across the country to The Moosilauke, which was the stopping-place for the night. On Sunday, contrary to the usual custom, the trip was continued, the journey being, however, only a short

one, the six miles of road up Moosilauka to the Summit House. On Monday a trip was taken by the Beaver Falls path to the meadow and into Lost River. The new road from Woodstock to Benton was followed for some distance, the party then diverging from it and passing out of the forest by the old trail. From the entrance to Jackman Falls, the path was taken past the falls and over Mt. Cilley to Woodstock, stopping for the night at the Barron Mountain House. On Tuesday the way was taken over into Waterville, but by a novel route. Eastman's Brook was followed from Thornton Gore to East Pond, from which a line was struck up the side of Scar Ridge to Henry's boundary, which was followed to the summit of Osceola. It was an interesting walk, the party arriving at the summit at four o'clock. An hour was spent here, and Waterville reached in time for supper. On Wednesday the trip was over Black Mountain to McCrillis's, and on Thursday by the woods path to Wonalancet, thence by the pleasant river path to Locke's Falls, and by the cut-off to the foot of Chocorua and to the summit by the Brook path. The descent was made to Piper's for the night. On Friday carriages were taken for the Chase Farm, and the party crossed the wire bridge, especially repaired for the occasion, and began at once the ascent of South Moat. The day was spent on the Moats and their connecting ridge, the descent being made after four o'clock to the Intervale House. Saturday was devoted to Kearsarge, the party ascending by the regular path and descending through the woods into Dundee, whence a line was taken over the shoulder of Thorn Mountain down into Jackson, the terminus of the day's walk being the Iron Mountain House, where eight members registered. Of these two returned to Boston, leaving six for a camping-tramp in the forest of the Pemigewasset. The start was made on Monday with two guides, and the train was taken to Sawyer's River, where the walk began. First to Livermore and then into Carrigain Notch, was the order of the march, the camping-place for the night being in a turn of the river in the midst of the great blow-down, well known to woodsmen. The walk Tuesday was down the south fork of the East Branch, an exceedingly pleasant one despite the heat. Luncheon was taken at the Forks, and the afternoon was devoted to ascending the true East Branch, which was crossed and recrossed many times. Camp was made about two miles below Thoreau Falls. The third day of the tramp was also fine, although warm. The morning's walk was up through the burned region to the Falls, where more than an hour was spent, thence out by way of the Zealand Notch, which presents a most desolate object lesson of the folly of modern methods of cutting down the forests. By three o'clock in the afternoon the party was clear of the woods and another exceedingly successful walking party was ended. The distance covered during the walk was, according to the map, about 130 miles. Allowing for an exertion equivalent to three miles an hour for the time consumed, the distance may be estimated as equivalent to about 240 miles.

On the evening of Friday, September 18, members of the Club to the number of 89 began the trip to the ADIRONDACKS in a special train of sleeping

cars for Westport, N. Y. After breakfast at Westport Inn carriages were taken, and, with a noonday halt at the Hunter's Home for luncheon, the party reached St. Hubert's Inn late in the afternoon. Sunday was spent in various ways, some 40 making the ascent of Noonmark. All-day walks were planned for each day of the stay, with short morning or afternoon walks for the less ambitious. On Monday 45 persons ascended Giant. In the evening Mr. Weston invited the party to his camp for a campfire. On Tuesday the party went to the camps on Upper Ausable Lake, 32 remaining over night and 25 of these making the ascent of Mt. Marcy. On Thursday 15 made the ascent of Gothic. On Friday the party changed its base of operations to the Stevens House at Lake Placid, and on Saturday 35 climbed Whiteface. For Sunday there was no regular programme, and on Monday the party returned to Boston, visiting Au Sable Chasm on the way. The party arrived in Boston on Tuesday at noon. The committee consisted of Messrs. George D. Newcomb, Albion D. Wilde, and George W. Taylor.

EXCURSIONS.

Date 1903	Objective Point	Committee	Attendance
Feb. 14-24.	Jackson, N. H. (Snowshoe).	{ Mr. Davis. Mr. Lawrence.	121
May 29-June 2.	South Lyndeboro, N. H.	Edward Moffette.	44
June 27-July 6.	Intervale, N. H. Field Meeting.	J. Ritchie, Jr.	58
July 15-Sept. 8.	Three Mile Island Camp.	R. B. Lawrence.	155
Aug. 1-15.	Camp at McCrillis's, Whiteface, N. H.	{ Mr. Perkins. Mr. Ritchie.	26
Sept. 4-8.	Bridgton, Maine.	Edward Little Rogers.	69
Sept. 4-14.	Walking Party in White Mountains.	J. Ritchie, Jr.	11
Sept. 18-29.	St. Hubert's Inn, Adirondacks, N. Y.	{ Mr. Newcomb. Mr. Taylor. Mr. Wilde.	92
Total, 8 Excursions			576

OUTINGS.

Date 1903	Objective Point	Distance Miles	Leader	Attendance
Jan. 10.	Rattlesnake, West Quincy.	3	J. Ritchie, Jr.	38
17.	Hawk Hill and Sandy Valley, Dedham.	4	Edward Moffette.	33
24.	Mt. Bellevue and Stony Brook Reservation, West Roxbury.	3	J. A. Crosby.	34
31.	Doublet Hill, Roberts.	3½	E. G. Chamberlain.	32
Feb. 7.	Hammond Woods, Chestnut Hill.	3	E. L. Rogers.	46

	14.	Worcester Pines, Prospect Hill, Waltham.	4	F. V. Fuller.	35
	21.	Chestnut Hill (Snowshoe party).	3	A. R. Bailey.	28
	23	(all day). Lynn Woods, Shorey's to Bow Ridge Camp (Snowshoe party).	5	A. D. Wilde.	60
Mar.	7.	Indian Camp Pool, Chickatawbut, Bouncing Brook, Barberry Bush Spring and Wild Duck Pool.	4	E. L. Rogers.	78
	14.	Hog Rock, Wakefield.	4	H. A. Perkins.	47
	28.	Echo Bridge, Falls and Hemlock Gorge.	4	E. G. Chamberlain.	60
Apr.	11.	Glover, Bear and Hawk Hills, Milton.	2½	P. B. Field.	59
	18.	Rocky Hill, Noanet Hill, Dedham.	4	Edward Moffette.	63
	20	(all day). Gloucester, Beach walk to Rockport.	5	{ Mr. Newcomb. Mr. Crosby. Mr. Wilde.	230
	25.	Abandoned Quarries, Old Furnace Brook, West Quincy.	3	E. L. Rogers.	70
May	2.	"Lost Trails in three cities," West Roxbury.	4	F. O. Carpenter.	62
	9	(all day). Blue Hill Range. (afternoon). Hancock and Great Blue.	9	J. Ritchie, Jr.	47
			3	G. D. Newcomb.	53
	16.	Howlett's Pond to Castle Hill, Wakefield.	4	H. A. Perkins.	82
	23.	Morse's Pond and Lake Waban, Wellesley.	5	W. A. Brooks.	60
	30	(all day). Shaker's Glen, West Medford.	7	{ E. L. Homer. J. A. Crosby.	60
June	6	(all day). Carlisle Pines. (afternoon). Lynn Woods.	5	E. L. Rogers.	32
			3	A. R. Bailey.	54
	13.	Hog Rock, Happy Hollow, Hart's Hill, Wakefield.	2½	H. A. Perkins.	20
	17	(all day). Baker's Island. Inspection of lighthouse.		{ Mr. Newcomb. Mr. Crosby. Mr. Wilde.	152
	20.	Everett Hill, Islington.	3	Edward Moffette.	62
Sept.	12.	Castle Rock and Little Castle, Wakefield.	3	H. A. Perkins.	52
	19.	Mangus Hill, Wellesley.	4	E. G. Chamberlain.	52
	26.	High Rock and Satan's Kingdom, Dedham.	4	Edward Moffette.	60

Oct.	3	(all day). Big Blue.	J. Ritchie, Jr. }	
		(afternoon). "	J. A. Crosby. }	110
Oct.	10	(all day). Cobbett's Pond, N.H.		
		Mr. Perkins' Camp. Din-		
		more's and Jenny's Hills.	6	H. A. Perkins. 12
		(afternoon). Lynn Woods.		A. R. Bailey. 14
	24.	Neponset River-bank, Milton.	3	A. E. Lanning. 85
	31	(all day). King Noanet Coun-		E. L. Rogers. 29
		try, —	10	{ E. Moffette.
		(afternoon). Bellevue Hill and		
		Stony Brook.	3	J. A. Crosby. 39
Nov.	3	(all day). Peabody Boulders.	6	J. Ritchie, Jr. 34
	7	(moonlight). Pegan Hill, Bai-		
		ley's Hotel for supper,		
		Wellesley.	5	G. D. Newcomb. 83
	14.	Monatiquot Trail, Milton.	4	E. L. Rogers. 74
	21.	Winchester Hill, Cold Spring		
		Grove.	4	E. G. Chamberlain. 60
	28	(all day). Boylston Reservoir.		Professor Barton. 23
		(afternoon). Lynn Woods.	4	A. R. Bailey. 60
Dec.	5.	Rattlesnake and Rattle Crag,		
		West Quincy.	3	J. Ritchie, Jr. 21
	12.	Lynn Woods.	4	T. E. Parker. 84
	19.	Forest Hill, Greenwood, Cry-		
		stal Lake, Wakefield.	3	H. A. Perkins. 38
		Total attendance, 8 excursions		576
		44 outings		2527
				3103

JOHN RITCHIE, JR.,
EDWARD LITTLE ROGERS,
GEORGE W. TAYLOR,
GEORGE D. NEWCOMB,
EDWARD MOFFETTE,
HARLAND A. PERKINS,
ALBION D. WILDE,

Committee on Field
Meetings
and Excursions.

Proceedings of the Club.

May 8, 1903. — Special Meeting ; held at Room 22 Walker Building.

President Barton in the chair.

About three hundred persons were present.

Miss Minna Eliot Tenney gave an illustrated lecture entitled "Beautiful New Brunswick and Historic Quebec." The literary and historical allusions

were particularly interesting, also the fishing and hunting incidents, and the description of the lumber industry. The various cities and villages, rivers and falls of New Brunswick, the attractions of Quebec, Lake St. John, and the Saguenay were illustrated by a hundred lantern views.

May 13, 1903. — Two hundred and twenty-eighth Corporate Meeting ; held at Room 22 Walker Building.

President Barton in the chair.

About one hundred and seventy-five persons were present.

Mr. Charles Mason Fuller, formerly of the Navy Department, gave an illustrated lecture entitled "The Panama Canal." After a few introductory remarks about the world's commerce and the canals of other countries, especially the Suez Canal, the speaker, from a map of Central America, showed the seven routes which had been considered. The Nicaragua and Panama routes were described at length, maps, plans, profiles, etc., being used for purposes of description and comparison. The towns of Colon and Panama, the railroad across the Isthmus, methods of excavation, the tropical vegetation and scenery and the Spanish and Indian inhabitants of the country, were illustrated with a large number of lantern views.

May 19, 1903. — Special Meeting ; held at Room 22 Walker Building.

Professor William H. Niles in the chair.

One hundred and sixteen persons were present.

The President, Professor George H. Barton, addressed the Club on "Topographical Forms in Eastern Massachusetts." He selected examples of type forms, described their origin, and discussed their value in the walks of the Club. He described the destructive and constructive agencies acting upon the earth through frost, acid, waves, rain, and ice. A large number of lantern views were shown illustrating these changes and showing drumlins, boulders, eskers, sand-plains, kames, terraces, and kettle-holes. Professor Niles closed the meeting with a tribute to Louis Agassiz, who was the first to call attention to the physiographical features in New England resulting from the glacial period.

June 10, 1903. — Two hundred and twenty-ninth Corporate Meeting ; held at Room 22 Walker Building.

President Barton in the chair.

There were present one hundred and twenty-five persons.

Mr. Frank O. Carpenter presented the valuable results of his many years of experience in climbing and tramping among the White Mountains, particularly as regards equipment.

Mr. Allen Chamberlain exhibited a tent, aluminum utensils, and emergency rations. Dr. R. C. Larrabee discussed available foods and the use of the poncho, and exhibited his camp-kettle. The discussion was continued by Messrs. C. H. Ames, H. W. Gleason, E. L. Homer, C. A. Newhall, the President, and the Recording Secretary.

June 19, 1903. — Special Meeting ; held at Room 22 Walker Building.

Ex-President Edward W. Howe in the chair.

One hundred and fifteen persons were present.

Mr. Warren H. Manning gave an illustrated talk on Porto Rico. He described the ranges of mountains which divide the island into sections, each with its individual architecture and other characteristics. The lantern views illustrated the cities and country, the vegetation, the inhabitants of the island, and particularly the gardens and the coffee, sugar cane, and tobacco industries. The speaker also gave a brief account of his ascent of El Yunque, about 6000 feet in altitude, the highest summit on the island.

June 27–July 6, 1903. — Thirty-eighth Field Meeting ; held at the Intervale House, Intervale, N. H.

On Monday evening, June 29, a session was held in the hotel parlor, fifty members and guests being present. President Barton presided. Mr. J. Ritchie, Jr., the Chairman of the Excursion Committee, announced the plans for excursions.

Mr. James Schouler, for many years a member of the Club, and a summer resident at Intervale, extended a hearty welcome to those present, and indulged in reminiscences of the early field meetings at North Conway and Intervale in 1876, 1878, and 1879.

Rev. Daniel F. Merriman gave a detailed account of the movement to preserve from destruction the Cathedral and White Horse Ledges, by which the sum of \$2520 was raised for their purchase, and the title was deeded to the State, in 1901.

President Barton read two poems : "The Hills of the Lord," by Frederick L. Hosmer, and "Sunday on the Hilltop," by William C. Gannett, after which he made a short address on the development of mountains. His remarks proved so interesting that upon request another session was held Thursday evening. Many questions were asked by those present, and much information was given by the speaker.

October 15, 1903. — Two hundred and thirtieth Corporate Meeting ; held at Room 22 Walker Building.

President Barton in the chair.

About one hundred and fifty persons were present.

The President appointed the following Committee to nominate officers for the year 1904 : Professor William H. Niles, Chairman, Professor William M. Davis, Mrs. R. P. Williams, Miss C. M. Endicott, and Mr. Albert F. Haynes.

Mr. W. S. Beekman gave a talk on "Picturesque Boulders." About one hundred fine lantern views were shown, mostly of boulders in eastern Massachusetts. The dimensions of the larger ones were given, including the Madison boulder, the largest of all, and in some cases views were shown of the ledges from which the boulders were torn by the ice sheet.

October 20, 1903. — Special Meeting ; held at Room 22 Walker Building.

President Barton in the chair.

About three hundred persons were present.

The President introduced Mr. George O. Shields, editor of "Recreation," who presented a paper entitled "Snow Slides in the Canadian Rockies." Pictures taken at Wilson Creek, British Columbia, in the spring of 1902, illustrated his subject. He also showed many colored slides of wild animals and birds, and gave an account of the game laws, and the means at present taken in the different states for the preservation of species of game of various kinds.

November 11, 1903. — Two hundred and thirty-first Corporate Meeting ; held at Room 6 Lowell Building.

President Barton in the chair.

Seventy-six persons were present.

Professor W. H. Niles, Chairman of the Committee on Honorary and Corresponding Membership, spoke at length upon the two nominees for Honorary Membership, Professor William H. Brewer and Dr. Julius Hann, and the four nominees for Corresponding Membership, Sir James Hector, Professor William North Rice, Mr. Charles Edward Mathews, and Mr. François E. Matthes.

The first business of the meeting was action upon the following amendments to the By-Laws, proposed by the Council : —

ART. III. Elections to membership shall be made by the Council, and the affirmative votes of at least four-fifths of the members of the Council present and voting shall be necessary to election; but no person shall be admitted to membership against the written protest of ten members of the Club. Nominations, in the form of a recommendation, shall be made in writing by at least two members of the Club, and forwarded to the Recording Secretary. They shall be announced on the call for a regular meeting and members shall have two weeks in which to express to the Council their objections. Balloting by the Council shall take place at any time after two weeks from the publication. Each candidate elected shall pay an admission fee of eight dollars, and on such payment shall be exempt from the annual dues of the current year, and those elected in October, November, and December of any year shall be exempt from the annual dues of the following year. The candidate so elected shall pay the admission fee and subscribe assent to these By-Laws within two months after the election, otherwise the election shall be void.

ART. XIII. The annual dues shall be payable January first, 1904. Those elected to membership before January first, 1904, shall pay three dollars. Those elected after January first, 1904, and whose residence and address is in Boston or in the neighboring cities or towns comprised in the Metropolitan Parks District, shall pay five dollars. Those elected after January first, 1904, and whose residence or address is outside of said District, shall pay three dollars.

Bills shall be sent to members on or near January first, and all members whose dues are unpaid on April first shall have notice of the fact sent them by the Treasurer. Members whose dues are unpaid on May first, and who shall continue such neglect for one month after notice referring to this article shall have been sent to them by the Treasurer, shall thereupon cease to be members, which fact in each case shall be certified in writing by the Treasurer to the Recording Secretary, who shall enter it of record ; but such membership may be revived by the Council in its discretion, upon payment of past dues. The President and Treasurer are authorized to remit any fee *sub silentio*, when they deem it advisable.

ART. XV. Any person may become a life member by the payment of fifty dollars at any time after election to membership and shall thereafter be subject to no dues or fees of any kind. Such sum shall include payment of the admission fee or dues for the current year.

The Recording Secretary explained the reasons for the proposed changes, and moved that the proposed form for Art. III. be substituted for the present one. This motion was laid upon the table, and Art. XIII. taken up. It was moved and seconded that the proposed form be substituted for the present. A long discussion followed, during which three amendments were passed, after which the article stood as follows :—

Art. XIII. The annual dues shall be payable January first. Those whose residence is in Boston or in the neighboring cities or towns comprised in the Metropolitan Parks District, shall pay four dollars. Those whose residence is outside of said District, shall pay three dollars.

As thus amended, the original motion was carried by a vote of 46 to 9.

The motion to amend Art. III. was then taken from the table, and carried unanimously.

It was also voted unanimously to adopt the proposed form for Art. XV. in place of the present.

The report of the Councillor of Topography, Mr. F. V. Fuller, was read by the Recording Secretary.

The reports of the other Councillors were deferred until the December meeting.

November 19, 1903. — Special Meeting ; held in Room 22 Walker Building.

President Barton in the chair.

There were present about two hundred and eighty members and friends.

The lecturer of the evening, Mr. Linwood O. Towne of Haverhill, spoke on "Nova Scotia and Cape Breton," illustrated with a hundred or more artistic slides. The party (the summer school of Professor Barton) journeyed from St. John to Moncton, across to and by the Bras d'Or Lakes to Sydney, back to Louisburg and Halifax, Annapolis, Digby, and St. John. The pictures were exceedingly interesting, especially those of country made famous by Longfellow's poem "Evangeline," and those illustrating the local high tides.

December 4, 1903. — Special Meeting; held in Huntington Hall.

President Barton in the chair.

About twelve hundred members and friends were present.

Commander Robert E. Peary addressed the Club. By means of maps and charts, the speaker traced upon the screen the routes followed in his various Arctic explorations, and with numerous views illustrated the scenery of mountain, snowfield, and icefloe, the experiences of Arctic travel, and the faithful Esquimaux and dogs. His highest point north was $84^{\circ} 17'$. He expressed his confidence that he can reach the pole. With a larger force enabling him to throw out reconnoitring parties, he believes that he can increase his speed of three or four miles, to ten or twelve, per day. Commander Peary's polar creed consists of three articles :—

First. — The pole should be attained for the sake of geographic and scientific knowledge.

Second. — The Smith Sound or American route is the only practicable one, as it offers a land base one hundred miles nearer the pole.

Third. — The attainment of the pole should be an object of American pride and patriotism.

The address was listened to with great interest, and at its conclusion a resolution, offered by Professor Charles E. Fay, was passed: "The Appalachian Mountain Club fully approves the plans of Commander Peary for future work, and it is the belief of the Club that there should be no hesitation or delay on the part of Americans in furnishing ample funds for outfitting his expedition."

After the adjournment of the meeting the library of the Institute of Technology was thrown open, and the speaker received several hundred members and friends.

December 11, 1903. — Special Meeting ; held in Huntington Hall.

President Barton in the chair.

The audience numbered a thousand people.

Mr. George Wharton James gave an illustrated lecture entitled, "The Havasupai Indians of Havasu Canyon in Arizona." The Havasu is a tributary of the Colorado, and its Indians are "the people of the blue water." Visiting them as an English missionary, the speaker was adopted a member of the tribe, given every opportunity to study their customs and character, and in consequence came to respect and love them. The lantern views illustrated not only the people, but the grand scenery of the canyon within which is their home. The picturesque waterfalls and precipitous walls of rock, thousands of feet in height, were shown upon the screen. The beautiful blue water of the river and the wonderful coloring of the rocks were described, and also various experiences in descending the river and ascending the cliffs.

December 16, 1903. — Two hundred and thirty-second Corporate Meeting ;
held at Room 6 Lowell Building.

President Barton in the chair.

About eighty-five persons were present.

Second action was taken upon amendments to Articles III, XIII., and XV. of the By-Laws. The Recording Secretary moved that Article XIII be amended as passed at the November meeting.

Two amendments were proposed and lost.

An amendment offered by Mr. W. R. Chester, abolishing the distinction between resident and non-resident members, was adopted by a vote of forty-eight to seven, several non-resident members arguing in its favor. The original motion as thus amended was then passed by a vote of sixty-two to three, to read as follows:—

ART. XIII. The annual dues shall be four dollars, payable January first. Bills shall be sent to members on or near that date, and all members whose dues are unpaid on April first shall have notice of the fact sent them by the Treasurer. Members whose dues are unpaid on May first, and who shall continue such neglect for one month after notice referring to this article shall have been sent to them by the Treasurer, shall thereupon cease to be members, which fact in each case shall be certified in writing by the Treasurer to the Recording Secretary, who shall enter it of record; but such membership may be revived by the Council in its discretion, upon payment of past dues. The President and Treasurer are authorized to remit any fee *sub silentio*, when they deem it advisable.

Article III., as adopted at the November meeting, was then taken up, and passed unanimously:—

ART. III. Elections to membership shall be made by the Council, and the affirmative votes of at least four-fifths of the members of the Council present and voting shall be necessary to election; but no person shall be admitted to membership against the written protest of ten members of the Club. Nominations, in the form of a recommendation, shall be made in writing by at least two members of the Club, and forwarded to the Recording Secretary. They shall be announced on the call for a regular meeting, and members shall have two weeks in which to express to the Council their objections. Balloting by the Council shall take place at any time after two weeks from the publication. Each candidate elected shall pay an admission fee of eight dollars, and on such payment shall be exempt from the annual dues of the current year, and those elected in October, November, and December of any year shall be exempt from the annual dues of the following year. The candidate so elected shall pay the admission fee and subscribe assent to these By-Laws within two months after the election, otherwise the election shall be void.

The amendment to Article XV., as adopted at the November meeting, was then passed unanimously:—

ART. XV. Any person may become a life member by the payment of fifty dollars at any time after election to membership, and shall thereafter

be subject to no dues or fees of any kind. Such sum shall include payment of the admission fee or dues for the current year.

The Councillor of Art, Mrs. L. L. Tarlton, and the Councillor of Exploration and Forestry, Mr. Allen Chamberlain, presented their annual reports.

The remaining reports were deferred to the regular meeting in January.

January 13, 1904. — Two hundred and thirty-third Corporate [Annual] Meeting ; held at Room 6 Lowell Building.

President Barton in the chair.

On account of bad weather, the attendance was only fifty-six.

The President announced that he had appointed as Auditors John E. Alden, Albert E. Duffill, and Frederic W. Stone, and as Committee on Annual Reception William S. Rumrill, Edward Little Rogers, Martha A. Knowles, Martha A. Vinal, and Maud A. Hartwell.

The Annual Reports of the Recording and Corresponding Secretaries, Treasurer, Trustees of the Permanent and Reserve Funds, Auditors, and Trustees of Real Estate were presented.

The report of the Committee to nominate officers for 1904 was submitted in print, and upon ballot being taken the following candidates were unanimously elected:—

For President, John Ritchie, Jr. ; for Vice-President, Allen Chamberlain ; for Recording Secretary, Rosewell B. Lawrence ; for Corresponding Secretary, Frederic G. Bauer ; for Treasurer, Rufus A. Bullock ; for Councillors : Natural History, Hollis Webster ; Topography, Frederic V. Fuller ; Art, Martha A. Vinal ; Exploration and Forestry, Harlan P. Kelsey ; Improvements, James Sturgis Pray ; for Trustees : Permanent and Reserve Funds (for three years), Rest F. Curtis ; Real Estate (for four years), Augustus E. Scott.

The new President, Mr. John Ritchie, Jr., then assumed the chair. The reports of the Councillors of Natural History and Improvements, and of the Excursion Committee were presented.

January 19, 1904. — Special Meeting ; held at Room 6 Lowell Building.

President Ritchie in the chair.

About two hundred persons were present.

Mr. A. Lawrence Rotch gave a lecture entitled "Five Ascents to the Observatories on Mont Blanc." The lecturer's well-known investigations in meteorology and his intimacy with Messrs. Vallot and Janssen, builders of the observatories upon Mont Blanc, rendered his subject very interesting. His experiences in his several ascents included all sorts of weather and conditions of snow and ice, not omitting that distressing malady, mountain sickness. Lantern views were shown of the observatories, of the mountain, as a whole and in detail, of glaciers, séracs, and crevasses, as well as extensive views from the summit.

January 28, 1904. — Special Meeting ; held at Room 6 Lowell Building.
President Ritchie in the chair.

About two hundred and twenty-five persons were present.

Mr. Edward Little Rogers gave an illustrated lecture entitled "The Blue Hills." The lecturer treated at length the history of the Blue Hills, including the taking by the Metropolitan Park Commission, and then conducted the audience on a trip among and over the various summits. The views thrown upon the screen, the work of Mr. Rogers's camera, illustrated the beautiful and interesting scenery at the different seasons of the year. Many of the photographs were taken upon Club outings.

February 9, 1904. — Two hundred and thirty-fourth Corporate Meeting ; held at Room 6 Lowell Building.
President Ritchie in the chair.

About two hundred persons were present.

Professor William Morris Davis presented a lecture entitled "A Journey in Turkestan," illustrated with the lantern. (See p. 277.) The trip was made with Professor Raphael Pumpelly under the auspices of the Carnegie Institute, and the reconnaissance was so successful that additional explorations, including excavations, are being planned for the future. The route was traced upon the map, the ancient size of the Caspian Sea was discussed, the desert plains, the rivers, and mountains were illustrated, and views shown of the nomads and the town-dwellers. The lecture was replete with information, and especially instructive as to the physical characteristics of the region.

February 18, 1904. — Special Meeting ; held at Room 22 Walker Building.
President Ritchie in the chair.

Two hundred and fifty persons were present.

Professor Herschel C. Parker of Columbia University was the speaker, his subject being "Climbing in the Canadian Alps ; First Ascents of Mounts Goodsir, Hungabee, Deltaform, and Biddle." (See p. 291.) Professor Parker first located the group of mountains with reference to the railroad, and spoke of the previous attempts to scale the mountains named. He characterized the four peaks as being of the first class in difficulty, using the mountains of Switzerland for a rough scale, and spoke quite at length about the elements in their structure which made them so difficult. The lecture was splendidly illustrated by means of lantern views, many of which were beautifully colored.

March 9, 1904. — Two hundred and thirty-fifth Corporate Meeting ; held at Room 22 Walker Building.
President Ritchie in the chair.

Three hundred and twenty members and friends were present.

Arthur Stoddard Cooley, Ph. D., late instructor in Greek at Harvard and

member of the American School at Athens, gave an illustrated lecture entitled "A Tour through Greece." Views were shown of many places interesting historically and archæologically, but special emphasis was placed upon the mountain scenery, there being twenty-nine mountains exceeding five thousand feet in elevation. The pictures were well chosen to illustrate the scenery of the following familiar names of places and mountains: Patras, Acro-Corinth, Piræus, Athens, Olympus, Ossa, the Vale of Tempe, the Monasteries of Metéora, Thermopylæ, Parnassus, Delphi, Acadia, the Styx, Taygetus, and Sparta.

March 15, 1904. — Special Meeting; held at Room 22 Walker Building.

President Ritchie in the chair.

About three hundred persons were present.

Mr. Harvey N. Shepard described a trip in Northern Scotland, illustrating with many photographs from his own camera. The tour embraced the east coast, the Orkney and Shetland islands, the Caledonian Canal, the west coast and the adjacent islands, especially Staffa and Skye. The picturesque scenery and many literary allusions combined to make the lecture very interesting. While appropriate views were upon the screen, the lecturer recited several poems from Burns.

March 29, 1904. — Special Meeting; held at Room 22 Walker Building.

President Ritchie in the chair.

Three hundred persons were present.

Mr. Tyler Morse gave an account of his experiences in Abyssinia, showing a large number of lantern-slides from negatives taken by himself. His object was hunting, but on account of the obstacles thrown in his way by officials and guides he was not successful in obtaining large game. The different races of the inhabitants were illustrated, together with their customs, dwellings, etc., and several pictures showed baboons and the heads of many varieties of antelope. The scenery of the country was illustrated, from monotonous desert to fine mountains, a view of the Blue Nile in a mountain gorge being especially good. After the lecture opportunity was given to examine a collection of shields, spears, knives, etc.

April 13, 1904. — Special Meeting; held in Huntington Hall.

President Ritchie in the chair.

About three hundred persons were present.

Mr. James Mackintosh Bell, formerly of the Canadian Geological Survey, addressed the Club on "The Great Mackenzie Basin." This was a trip of exploration from Athabaska Lake down the Slave River to Great Slave Lake, thence down the Mackenzie and up the Great Bear River to Great Bear Lake, and across country to Coronation Gulf on the Arctic Ocean, returning via the southeastern arm of Great Bear Lake and thence across to Great Slave Lake. The narrative was amply illustrated with maps and lan-



THE NORTHERN SIDE OF MONT BLANC.

APPALACHIA.

VOL. X.

BOSTON, NOVEMBER, 1904.

No. 4.

Five Ascents to the Observatories on Mont Blanc.

BY A. LAWRENCE ROTCH.

Read January 19, 1904.

MONT BLANC is essentially the mountain of the scientist, for no other mountain in the world has been the object of so many scientific ascensions or has had two observatories erected on it. Indeed, its first ascent by Balmat and Dr. Paccard in 1786 was stimulated by the attempt of De Saussure, the Genevan savant, to reach the summit for scientific purposes, which the next year he succeeded in doing. In 1844 the mountain was twice climbed by the French scientists, Martins, Bravais and Lepileur, and in 1857-58 and '59 its summit was attained by the English physicist Tyndall, who with his guides finally spent a most uncomfortable night there. In 1887 this feat was outdone by M. J. Vallot, who with M. F. Richard, a French instrument-maker, passed three days in a tent on the top in order to make meteorological observations.

It was the account of this expedition that first turned my attention to the giant of the Alps. A few years before I had visited the mountain meteorological stations in Europe, some account of which was given in APPALACHIA, Vol. VIII, No. II, and so heard with interest that M. Vallot proposed to establish a meteorological station on Mont Blanc. Through M. Richard, the constructor of some of my instruments at Blue Hill, an introduction was obtained to M. Vallot, who invited me to be present at the opening of his cabin the following summer. Since that time my interest in the "great white mountain" has never waned. I have visited the Vallot observatory five times, and have

thrice reached the summit, ascending or descending by the three routes on the French side of the mountain. The weeks of waiting at its foot and the days passed on the vast snow flanks have made me more familiar, perhaps, than any other American with its good and bad weather and with the rapid transitions from the former to the latter which constitute the great danger to the alpinist.

Having duly received a formal invitation from M. Vallot to attend the inauguration of his observatory-refuge at the Rocher des Bosses, I left New York July 12, 1890. On the 30th I arrived at Chamonix and at once engaged a guide and porter, and prepared to start up Mont Blanc with M. Vallot and his wife the next day. On greeting the party, I failed to recognize my hostess of the previous evening in her boyish garb. On this occasion I also made the acquaintance of their personal guides, Alphonse Payot and Michel Servioz, to whom so much of the success of the Vallot observatory is due.

Preceded by a party of porters laden with instruments and provisions, we left Chamonix at 6.30 on the morning of July 31 and rode on mules for two hours, up the steep, wooded path that skirts the glacier des Bossons, to the last châlet on *terra firma*, called Pierre Pointue. Here, as is customary, we breakfasted, and at a point an hour further up, called Pierre à l'Echelle, from the fact that here it was customary to have the ladders used in crossing the crevasses of the glacier, we entered on its passage, and at three in the afternoon reached the Grands Mulets, at an altitude of ten thousand feet, a rocky island separating two torrents of ice that lower down combine to form a frozen whirlpool called "the Junction."¹ Madame Vallot's maid, who had accompanied her thus far, was now sent back, and we prepared to make ourselves comfortable during the remainder of the afternoon and night at the old inn, since replaced by a more comfortable one higher up on the rocks.

The night was short, for we set out again at 4.30 the next morning by lantern light, though the dawn soon broke. The snow was hard with good tracks, so that progress was comparatively easy. First the Petites Montées are ascended on the Côte du Dôme, above which is the Petit Plateau, and thence the

¹ See Plate xliii.

Grandes Montées lead to the Grand Plateau. At the Petit Plateau there is usually a large crevasse which has been the scene of several accidents. After toiling up the last steep slope above the Grand Plateau, at 10 o'clock we reached M. Vallot's cabin, then situated upon some rocks hardly perceptible above the snow, at an altitude of 14,320 feet.

The history of his enterprise up to this time is briefly this. From a study of the upper portion of Mont Blanc, M. Vallot concluded that only at the foot of the Grande Bosse du Dromadaire could a permanent building be erected. After a wooden cabin had been constructed at Chamonix, it was taken apart and carried upon the backs of one hundred and twenty guides and porters during the early summer, and was now barely completed. It was stipulated by the commune that there must be a refuge for guides and tourists; so the cabin was designed to include this on one side and the observatory on the other. When the difficulties of transporting the materials in loads of such size and weight as could be carried on a man's back are considered, the magnitude of the enterprise will be appreciated, and the fact that the greater part of its ultimate cost of \$20,000 should have been paid for portage will not seem surprising. In APPALACHIA, Vol. VII, No. II, is a picture (Plate xxxii.), of the cabin after it had been completed during our stay there. It was equipped with a variety of physiological and physical apparatus, including self-recording meteorological instruments, which were intended to operate a week or two without attention.

Up to the time of arriving and for some hours afterwards I had felt quite well, and was congratulating myself that, though I had hardly got my sea-legs off and had never before climbed above 12,000 feet, my frequent ascents of Blue Hill during the previous five years quite made up for alpine training. I was soon disillusioned, for a few hours later I was seized with that most distressing malady, which I had heard called "mountain sickness," and which may be described to those who have not been a victim to it, as a violent form of sea-sickness, aggravated by cold and fatigue. All night it lasted, though some relief was afforded by breathing oxygen, which Vallot had thoughtfully provided in a compressed state. Misery loves company, and this I had in the person of Madame Vallot. Altogether we had

a most uncomfortable night, suffering also from the cold, which was about 20° Fahr. outside. In the morning I was well enough to aid in setting up the barometers and to undertake preliminary spectroscopic observations. At noon it was decided to make the ascent to the summit, as the weather, which had been fine, showed signs of changing. The summit of Mont Blanc lies 1460 feet above the Vallot cabin; and, as the slopes of the Bosses are very steep, 45° or more in places, this is the most fatiguing part of the entire ascent.

In climbing the Grande Bosse, I learned a lesson which has stood me in good stead since. Being roped on the narrow arête, which on each side has precipices extending down thousands of feet to the French and Italian valleys respectively, I had been cautioned to place my feet exactly in the footsteps of the leading guide. Looking around I failed to do this, and suddenly felt myself sliding down the steep and icy slope toward Italy, although meanwhile I was vainly trying to arrest my fall with my ice-axe. I seemed to fall hundreds of feet — in reality perhaps ten — and then was checked with a jerk which nearly cut me in two and deprived me of breath. My guides had held firm in their tracks, and I was ignominiously hauled up, dangling like a fish on a line. It was a good lesson, and I never pass that spot without blessing the rope and my sure-footed Chamoniards. During this trying climb of two hours the weather rapidly got worse, and we found the summit enveloped in whirling clouds, and so descended to the cabin as speedily as possible in driving snow, amid an electrical storm which caused our ice-axes to hiss and become luminous and the skin to tingle. The night was a terrible one, the gale roaring and shrieking and at times threatening to blow away the cabin, as it did the large tent outside used by the guides and for stores. Both Madame Vallot and myself were again a prey to mountain sickness, and the odor of the petroleum stoves, used for keeping the temperature up to freezing, only increased our discomfort. The morning dawned fine, and I was able to make a series of satisfactory measurements relating to the polarisation of the sky and the calorific power of the sun, which were among the objects of my visit. I also photographed some curious cloud forms peculiar to Mont Blanc. At 9.40 we started downwards, reaching Chamo-

nix without incident at 6.30 P. M., and were met by the mayor and chief guide with music, flags and flowers, a compliment which the Vallots returned by a collation at their chalet. To understand this enthusiasm of the authorities it must be explained that, since tourists are the main source of income of the commune, anything which draws attention to Mont Blanc or facilitates its ascent is of great importance, and besides, the construction of the Vallot cabin had furnished many of the guides and porters employment during the winter. From that time to the present, M. Vallot has been the king of the village.

Another noteworthy event for Chamonix happened during the summer of 1890, when M. Janssen, the eminent French astronomer, although seventy years of age and lame, was dragged up Mont Blanc on a sledge, after being carried in a chair over the glacier. Having made spectroscopic observations of the sun, he decided that the summit of Mont Blanc would be a useful and not impossible place for an observatory, and succeeded in getting half a million francs subscribed and securing the advice of the famous engineer Eiffel. All this interested me greatly and brought me back to Chamonix the following year, but unfortunately not until October, when on the 5th I again started for Mont Blanc with M. Vallot and M. J. Richard, who was supervising the erection of a meteorograph for M. Janssen in a cabin erected by the French Alpine Club at the Grands Mulets. The passage of the glacier was much worse than in the preceding year, for owing to the lateness of the season there were a couple of feet of snow at the Junction.

The next morning at 8 o'clock our large party left the inn at the Grands Mulets in three divisions, first, four guides to break a track through the deep snow, then eight porters, and finally Vallot, my porter and myself. Our route was up the slopes of the Dôme du Goûter, where there was less fresh snow, and the Rocher des Bosses was reached after an exhausting march at 3.30 in the afternoon. Five of the porters were sent back to lessen the expense.

During the night the thermometer fell to 12° Fahr. and the temperature in my room was 22°, because again being attacked with the mountain sickness (which oxygen failed to relieve, though phenacetine alleviated it somewhat) I could not bear the

smell of the oil stove. I experienced also the unpleasant sensation of sleeping in the bed where a death had occurred the month before, namely that of Dr. Jacottet, a Chamonix physician, who had volunteered to care for the workmen engaged in digging the tunnel in the summit of Mont Blanc. Although accustomed to mountains, the doctor was taken ill with what is locally known as congestion of the lungs, and died in a few hours. These sudden deaths, at high altitudes, of men accustomed to mountain climbing, and of which I shall have occasion to mention another case, seem to merit the investigation of physiologists.

In the morning, Vallot, who is as well on the mountain as in the valley, busied himself with his instruments, but I had too little energy to observe or to assist. The threatening weather prevented ascending to the summit of Mont Blanc, where, by direction of M. Janssen, a tunnel was being dug to ascertain whether there was any rock which might serve as a foundation for his proposed observatory. The weather becoming worse, the descent to the Grands Mulets became advisable; and accordingly in the afternoon we went down, finding plunging through snow two to three feet deep exhausting. The night was comfortably spent in the Alpine Club observatory,¹ already mentioned. It snowed all night; but the next morning was clear, permitting us to institute some trigonometrical and physical observations at this altitude.

August, 1892, found me again at Chamonix, with sufficient leisure to make several "courses d'entraînement," preparatory to another ascent of Mont Blanc. This time, M. Vallot, who had but recently returned from the Bosses, was unable to accompany me, but sent one of the guardians of the observatory, Alphonse Payot, and in addition I had the regulation guide and porter. Leaving Chamonix on foot on August 29, we saw the materials for the Janssen observatory lying along the path, and arrived at six in the evening at the Grands Mulets. My route the next morning was by the Corridor and Rochers Rouges, this way diverging to the left from that to the Bosses at the Grand Plateau, where I made a halt for meteorological observations. The ascent from the Plateau to the Rochers Rouges is over a crevassed glacier, but except this, the Mur de la Côte above and another steep slope leading to the "calotte" of Mont Blanc,

¹ See Plate xliii.



OBSERVATORY OF THE FRENCH ALPINE CLUB, GRAND MULETS.
JUNCTION OF THE GLACIERS DES BOSSONS AND DE TACONNAZ

there are no bad places. The "calotte," or pear-like summit ridge, being surmounted at 2.30 in the afternoon, my first view was obtained through driving clouds. Observations in the tunnel, thirty-three feet below the top, showed the temperature of the snow to be 5° Fahr., which probably represents approximately the mean annual air-temperature on Mont Blanc. The temperature of the air outside at this time was 20°. Finding no foundation for his observatory, M. Janssen had embedded a little hut in the snow to test its stability. A refuge-observatory was in construction at the Rochers Rouges, 14,790 feet, to serve as an intermediate station between the Grands Mulets and the summit, small windlasses being used to raise the parts up the steep slope of the Mur de la Côte. We descended the Bosses in a southerly gale, and I found the Vallot observatory quadrupled in size and the public refuge removed to a rock above.

I had intended to descend by the Dôme and Aiguille du Goûter, in order to view the glacier of the Tête Rousse, from under which a few weeks before a subterranean lake had burst, and rushing down into the valley had destroyed the Baths of St. Gervais and one hundred and fifty of their visitors. A snow-storm, however, made any attempt to cross the vast expanse of the Dôme du Goûter hazardous, and so at 2 P. M. we began the descent by the well-known way. Arrived at the Grand Plateau the drifting snow had completely obliterated the usual tracks and prevented us from seeing any landmark. For a few minutes we were completely lost and knew not which way to go. A little cessation in the fall of snow enabled the keen-eyed guide to discover one of a series of stakes which had been placed that year by the French Alpine Club all along the route from the Grands Mulets. But for this providential circumstance I might have suffered the fate of an English alpinist who, the week before, had been caught in a snow-storm on the Dôme du Goûter, all the details of whose death we had heard discussed at Chamonix. This Mr. Nettleship and his guides dug a hole in the snow, and managed to pass the night without freezing. The next morning, though snow was still falling, the party started forth, Mr. Nettleship saying it was better to die like men than like rats in a hole, but after a few steps the Englishman staggered and fell dead, his guides discovering, as the storm

ceased, that they were within a few hundred yards of the Vallot refuge. In our own case, having found the line of stakes, one was always kept in sight until the Petit Plateau was reached. Here the snow ceased, and we hurried down to Chamonix, arriving at 7.30 P. M.

The next year, though I saw the highest peaks of the Andes, my thoughts often recurred to Mont Blanc. It was three years, however, before I could return thither, and my campaign during the summer of 1896 was a disastrous one. While coming over the Furka Pass I made a misstep in a dimly lighted inn, and falling dislocated my right shoulder, necessitating a return to Lucerne; but a week later I managed to reach Chamonix. The weather remained persistently bad and the snow descended low into the valley. Finally, after M. Vallot and I had been ready for ten days, the 27th of August dawned clear, and we lost no time in making a start for Mont Blanc, Vallot preceding me with twenty guides and porters carrying instruments and provisions. My right arm was bound to my side, so that I could not be roped on the glacier; nevertheless, as the ice was in good condition, it was easily traversed, and in six hours we were at the Grands Mulets. Meanwhile, with a shift of wind to the bad westerly quarter, the weather had also changed; but we hoped for the best and spent an enjoyable evening with Mr. C. E. Mathews, the eminent English alpinist, and with his colleague Mr. Morshead, another famous climber. The former, who, perhaps next to M. Vallot, holds the record for amateur ascents of Mont Blanc, is now an honorary member of our Club. Our hopes were not realized, for during the night a foot of snow fell, and as this indicated several feet of fresh snow on the Grand Plateau, an ascent was not to be thought of. The snow continued all day, and in the afternoon we were reluctantly forced to descend, for the cost of keeping our large company of guides and porters in so expensive a place was prohibitory. The passage of the glacier with its crevasses masked by the fresh snow was safely accomplished, and we reached Chamonix before dark. I had no more leisure to try Mont Blanc again that year, and so, despite M. Vallot's remonstrances, the next day, a most beautiful one, I crossed the Col de Balme, which was entirely covered with the new snow. The sight of Mont Blanc glistening in its spotless mantle against the deep

blue sky — to my mind at all times the most striking view of the mountain — impressed me more than ever before and made me promise myself to return. This, however, could not be done until the year 1900, when in coming from Switzerland I again traversed the Col de Balme. This time I could not hope to climb the mountain, for I was on my way to Paris to attend some international congresses at the Exposition, having already missed the Alpine Congress, to which I was a delegate of our Government. All I could do, therefore, was to watch the summit of Mont Blanc for a day, and hear from M. Vallot how he had removed his observatory from its former position, where it was in danger of being buried in the snow, to another site nearer the refuge. I think that since then his health has not permitted him to visit it, but he has published, in five handsome volumes, the investigations relating to meteorology, physiology, and glaciers, executed by himself and by others who have sojourned at the observatory, which its founder — an honorary member of our Club — generously places at the disposal of any savant who desires to work there.

Last summer I settled in Chamonix with my family ; and to any, whether climbers or not, who desire a delightful summer resort, I can recommend Chamonix and the Hôtel du Mont Blanc with its genial proprietor, Cachat. The weather during the greater part of last August was excessively bad. Storms succeeded each other rapidly, and a great quantity of snow fell on the high mountain, and smaller quantities down to six thousand feet. I had made up my mind that I must see both the new observatories on Mont Blanc, if possible ; and with the first fine weather, all was arranged that I should do so, Vallot having put his observatory and one of its guardians at my disposal, and Janssen giving me the entrée to his establishment.

At noon on August 28th, with my two guides, one of whom in his desire to accompany me consented to act as porter, I started up the well-known path to Pierre Pointue. It is customary to hurry off at daybreak, thereby broiling in the afternoon sun on the glacier and having a dull afternoon in the cramped quarters at the Grands Mulets. As an experienced traveller, I preferred to cross the glacier in the cool of the afternoon and arrive at the inn at sunset, taking the risk, of course, of finding

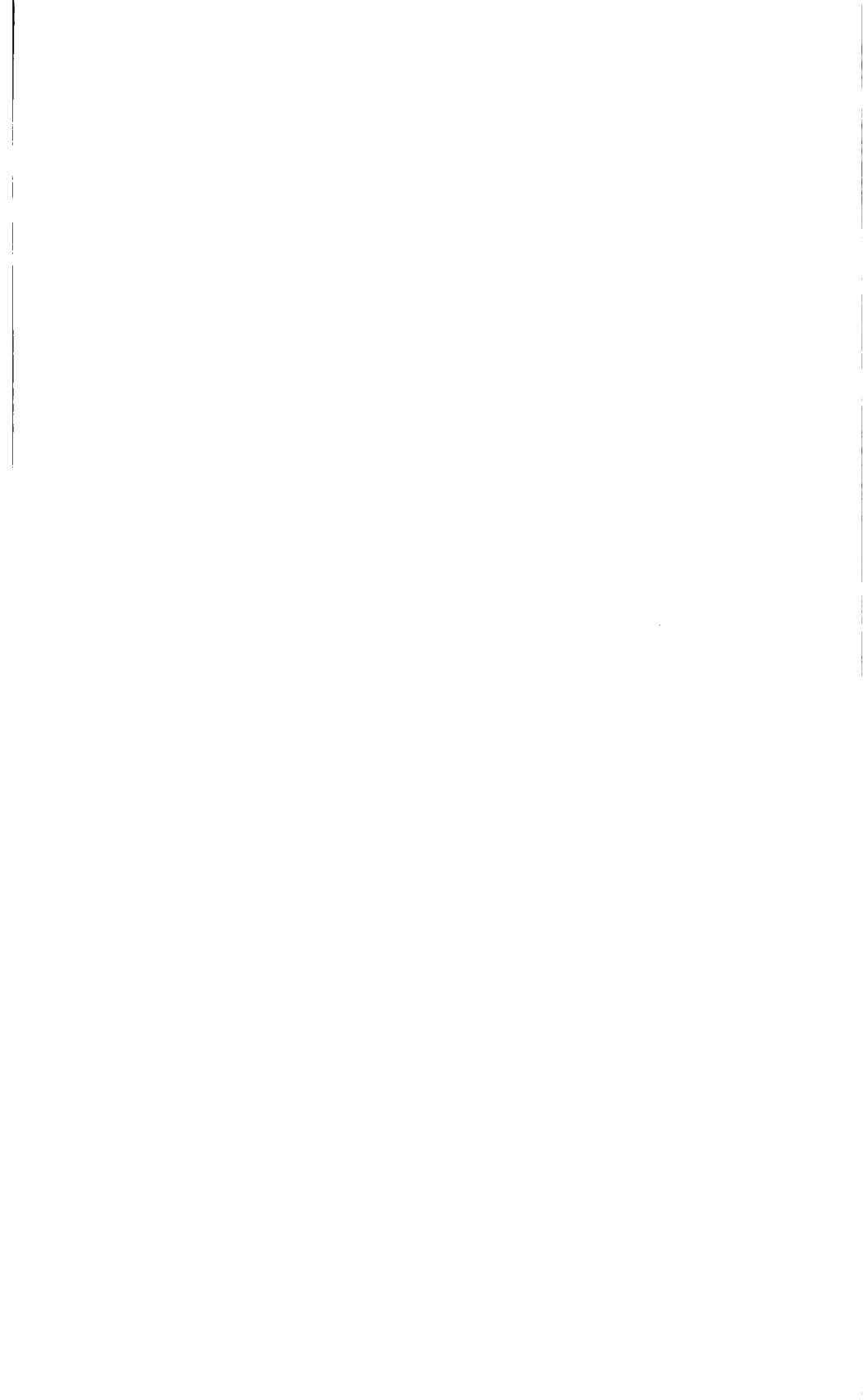
it full. The sunset was glorious and the moonlight at least twice as bright as it was below, though, on account of the purity of the air, the shadows were intensely black. We were all in bed at nine, but after a few hours sleep I was awakened by suffocation and dizziness, with pulse increasing to one hundred beats a minute as I lay at rest. There was no doubt that these were symptoms of mountain sickness, which at that comparatively low altitude can only be attributed to a large quantity of quinine that I had taken to check a cold before starting. I soon had a high fever, and endeavored in vain to find relief by walking outside in the cold night air. Far below I could see the lights of Chamonix, and thoughts of descending at once entered my head, for I felt I could not climb Mont Blanc the next day.

However, I disliked to awaken the guides who were snoring comfortably in their adjacent quarters, and so I passed several restless hours, till at 2 A. M. every one was stirring. Then I timidly told my guide that I thought I must go back, an idea which he scorned, and so I weakly acquiesced in his suggestion that at least we see the sunrise on the Grand Plateau. There were several parties starting, and the chain of lanterns, winding up the steep slope and finally disappearing among the stars, produced a most singular effect. My legs trembled like those of a drunken man, and I had to stop frequently for breath, so that every one, including some ladies, passed us. On arriving at the Grand Plateau, I was inveigled, as I expected, into going on to the Vallot observatory, of which we present a photograph in its new location high above the snow.¹ The observatory was opened and hot food prepared, but I could eat nothing and had barely strength to gather up the sheets of the recording instruments desired by the owner. Now I was told that I must get to the summit, and again I had not the strength of mind to resist, so we began the tedious climb over the Bosses. The fine weather had given place to fog, which, driven by a fierce west wind, chilled us to the bone as it swept across the sharp arête, to which we had to cling on all fours. My guides had threatened to drag me up if I could not walk, but after reaching the Rocher de la Tournette I summoned up courage to call a halt, and said in effect that as we had all been more than once on the top,

¹ See Plate xliv.



THE NEW VALLOT OBSERVATORY.
THE JANSSEN OBSERVATORY, LOOKING EAST.
MONT BLANC AND THE BOSSES



where evidently to-day we could not stand upright or see anything, and inasmuch as they had gone beyond the point which entitled them to receive the tariff for a complete ascension, I commanded them to turn about. Seeing me in earnest, they reluctantly did so. At the Grand Plateau I witnessed some most extraordinary iridescent clouds sweeping in concentric layers over Mont Blanc and the adjoining peaks. To my great satisfaction Mont Blanc was hidden in a black cloud the rest of the day, and the weather aloft was reported frightful by descending travellers. It is hardly necessary to say that I was quite well long before reaching Chamonix, and had made arrangements with my permanent guide to try again on the second day following, accompanied by a porter who knew the way down the Aiguille du Goûter.

This ascent begun on August 31 was entirely normal. Again I arrived at the Grands Mulets just as the sun was setting, and joined forces there with M. Donitch, a Russian astronomer, who proposed to make spectroscopic observations on the summit, and with Count de la Baume-Pluvinel, who wished to install there a new meteorograph which he thought would operate all winter. After a good night's rest we again started at 2.30 A. M. This time it was my party who took the lead, and after witnessing a second time within three days a most beautiful sunrise on Mont Blanc, we reached the Bosses at seven o'clock. Having breakfasted in the open air we pushed on to the summit, arriving in prime condition at 9.30. The weather was superb and the view embraced hundreds of mountains in France, Switzerland and Italy, the accompanying photograph¹ giving some idea of what was seen towards the east. Though the air temperature was 22° and that of the snow but 10°, the absence of wind made it seem really warm.

At last I was alongside the famous Janssen observatory, built at Paris and transported to Chamonix, whence the whole edifice (it is constructed of wood and weighs sixteen tons) was carried in seven or eight hundred loads on the backs of guides and porters to the summit of Mont Blanc during the summer of 1893, and there put together and half sunk in the snow. The observatory was intended primarily for spectroscopic work, but

¹ See Plate xliv.

it was expected to secure continuous meteorological observations by means of a meteorograph, designed to operate three months without attention. On the roof is a tower, reached by a spiral staircase from within. This tower still rises well above the snow, into which the whole building is steadily sinking. A photograph taken in 1893, compared with one which I took from the same position last summer, shows that in the ten years the building has been displaced about thirty-five feet toward the northern slope, down which it will soon begin to descend. It now stands in a hollow east of the summit-ridge, with the snow heaped up against the southern wall and excavated from about the western one. It is generally conceded that the cost of this observatory has been incommensurate with its usefulness, and that it must soon be abandoned. The most important work accomplished by M. Janssen has been to show that the oxygen-line in the solar spectrum is much enfeebled here, leading to the conclusion that the oxygen formerly supposed to exist within the gaseous envelope of the sun is simply that contained in the atmosphere of the earth. Determinations of the heat received from the sun, or the "solar constant," have also been made here, but even in favorable seasons the observatory can hardly be occupied more than a week. M. Janssen, himself, the first investigator, remained four days in 1893, but now, at the age of eighty, he can scarcely again ascend Mont Blanc, and so the melancholy spectacle is presented of the directors of both observatories, established by them with such labor, forced to remain at Chamonix and let others conduct the work on the mountain.

Entering the refuge on the west side of the building, we melted snow and prepared hot chocolate, after which I inspected the opposite side of the building forming the observatory proper. Considerable snow had penetrated through the windows and doors, making a most uncomfortable habitation, and there was a grave-like chill in the cellar, where ice thickly incrusting the meteorograph, which since its installation has persistently refused to operate. The other party did not arrive until two hours later, and the scientific members were too exhausted to begin observations for some time afterwards. They passed two nights amid uncomfortable surroundings, and on the second morning one of the older guides, attacked by the mysterious "congestion

of the lungs," died before he could be removed from the summit. I myself, resolving not to risk mountain sickness, started down at noon by way of the Bosses and continued the descent by the steep western side of the Aiguille du Goûter, over the loose rocks and across a couloir swept by falling stones during hot afternoons. Still, this route, especially for persons coming from Geneva, is likely to become popular, for the inn at the Tête Rousse, situated at a greater height than the Grands Mulets, can be reached without setting foot on snow. It is of interest, also, as constituting the proposed line of railway from the valley to the summit of Mont Blanc. From near the Tête Rousse we followed a mule-path leading down to the Pavillon Bellevue, whence a descent through the woods took us after dark to the village of Les Ouches, which an electric road unites with Chamonix.

And so ended my latest and possibly my last ascent of Mont Blanc, and I cannot take leave of the "great white mountain" better than with the following words of our honored member, Mr. C. E. Mathews: "Mont Blanc has now been known to five successive generations. Men may come and go, but its mighty summit abides untroubled by the coming and going of the world. And to those who know it well and love it dearly, come often, in quiet hours, teeming thoughts which swarm like bees; sunny memories of successful endeavor, of transcendent beauty and of priceless friendships, which have added health and sweetness and happiness to life."

In the Southern Waputehks.

Mount Daly—Takakkaw Glacier and Fall—Lower Yoho Canyon.

BY EDUARD TEWES.

THE mountain chain lying directly to the north of Kicking Horse Pass, and known as the Waputehk range, differs in many respects from its neighbors to the south. Instead of clearly defined mountain masses, we see, as a rule, summits which rear themselves relatively but little above the elevated table-land from which they spring. A glacier formation of exceptionally great area and snow-fields of enormous extent combine to give

the range its special character, the landscape reminding one strongly of the snow-clad mountains of Norway. The valleys, of which the Yoho, which has only quite recently become known, is the most beautiful, have also a separate character of their own, and are especially noteworthy for their mighty waterfalls. The Waputehk range is sharply defined to the south and east by the valleys of the Kicking Horse and Bow rivers, and to the west by the Yoho Valley, and runs in a northwesterly direction, the watershed lying along a line over Mounts Daly, Balfour, and Gordon.

I had been on rambles over the mountains of the Bow range since the end of July, 1903, and finally had started with Professor C. E. Fay on an expedition to Lake McArthur and Mount Biddle. We had, while crossing Cathedral Pass on the way thither, enjoyed a magnificent view of the wild southern district of the Waputehk range, with its valleys, cut off from the outside world by virgin forests, and the immense ice-field which feeds the glaciers on both sides of the watershed. This view awakened in us the wish to learn more of the still little-known southern part of the range; we decided accordingly to make the virgin summit of Mount Daly (10,250 ft.) our objective. From there we expected to obtain a first-rate and very instructive view of the surrounding regions far and near.

On the 25th of August we left Field in order to carry out our plan. Our party consisted of Professor Fay, Mr. J. H. Batcheller of Deadwood, S. D., the writer, and two Swiss guides, Chr. Häsler and Bohren, both well known to the readers of this journal. It was our intention to penetrate into Sherbrooke Valley, one of the collateral valleys of the Kicking Horse from the end of which Mount Daly rises, to climb this mountain, and to make our way over the great ice-fields lying on its western flanks to the Yoho Valley; by what way we should quit it would depend upon the local conditions there. We had wanted to take pack-horses with us as far as Sherbrooke Valley, in order, as far as possible, to lighten our labor during the first part of the trip; but the sole and consequently very autocratic horse-owner in Field was clearly of opinion that he could employ his animals to more advantage elsewhere, and would not budge from his stereotyped answer, "You can't take horses there." Of course,

when later, in the heat of the midday sun, we arrived at the place, we perceived with ill-suppressed wrath that it would have been quite possible "to take horses there." There was, however, no help for it but to shoulder our packs ourselves, which was no doubt good exercise for certain muscles, but, none the less, the reverse of agreeable. In our case it meant a load of twenty to forty pounds per man. Only a week before Professor Fay and I, heavily laden and climbing a steep slope under a burning sun, had taken a solemn oath, in the sweat of our brow, never again to degrade the human form to the level of a pack animal; but man is an inconsistent creature, and besides we had no choice.

High officials of the C. P. R. had arrived in Field in private cars, and they very kindly offered to give us a lift as far as the pass and to put us down there, at the beginning of Sherbrooke Valley; in this way the first portion of our programme was carried out luxuriously, — in contrast to the usual methods of transport in vogue among mountaineers in the Rockies, to wit, cowcatcher or tender. The sun was already uncomfortably high when we left the cars and turned our backs on telegraph poles and rails, last representatives of civilization. The first part of our way lay through burnt timber, the sun shining down on us with more warmth than was absolutely necessary, and the mosquitoes assembling in their thousands to welcome the stranger. However, the forest was not on the whole very dense, nor were the slopes very steep. Ere long we reached the first level of the Sherbrooke Valley. It was, like all these wonderful Canadian high valleys, occupied for the greater part of its extent by an enchanting, emerald-green lake; and there, as we were not pressed for time, we lounged upon its wooded shore in blissful idleness. The view towards the entrance to the valley was of a ravishing description; the water, ruffled by a gentle breeze, glittered in the sun, and beyond, the snowy cliffs of Cathedral Mountain on the other side seemed to rise literally out of the bosom of the lake. After reaching the northern end of the lake, we climbed the slopes into a still higher level of the valley for another hour and a half in order to gain a sufficient elevation for our start the next day. Here we looked about for a suitable camping-ground, and found it in the shape of a cave,

large enough to contain the whole party, and many more if need were, and offering shelter from the rain which was beginning to fall. Our bivouac proved to be most enjoyable; in fact, I have seldom experienced one that was more so. We soon had a fire burning, for it was fairly cold, and we were glad to warm our limbs. We were, as usual on the first day, well supplied as regards commissariat, and each one, with the correct if ill-defined feeling that what was once eaten would not be a burden to the back next day, did his best towards making a clearance among the victuals. This was followed by an interval of interesting conversation; and finally, in the quality of music-loving mountain-climbers, we gave expression to our satisfaction in song. As we all had the wish to perform, and possessed abundance of sentiment with but little voice to give effect to it, a harmony resulted which must have caused every bear in Sherbrooke Valley to feel forever disgusted with his home. There is an indescribable charm in such lonely bivouacs in the wilds of the Rocky Mountains, and no one who has once experienced it can ever forget them. That evening our surroundings were of a nature specially to impress us with its power. The flickering light of the fire made the walls of our cave stand out in weird shapes against the blackness of the night, while every now and then a sudden tongue of flame would throw a pencil of light through the gloom of our surroundings and reveal for a second of time a confusion of boulders and weather-beaten pine-trees. Add to this the fathomless silence of the mountain, only broken by the monotonous murmur of the glacier stream and the sighing of the night breeze among the crags, — all combined to produce a deep and lasting impression.

It was still dark, except for the faint light of the stars, when we rose next morning at somewhere about 4 A. M. We made a hasty breakfast, strapped our packs on our shoulders, and left the cave whose hospitality we had enjoyed. Our way lay clear before us now. Two peaks rise from the northern end of the Sherbrooke Valley: Mt. Niles to the west and Mt. Daly to the east, — the latter being considerably the loftier of the two. These two mountains form the southern boundary of the great Waputehk ice-field, from which an offshoot runs down between their cliffs towards the Sherbrooke Valley. We mounted over



SHERBROOK VALLEY AND THE SOUTHERN WAPUTEHKS.

from a photograph by The Dominion Topographical Survey.

slopes of débris and winter snow towards this offshoot, in order to gain the glacier above the ice-fall, and soon reached a notch at the foot of the slope leading down from Mt. Daly. Here we deposited our belongings, and deliberated over the manner of our further ascent. It seemed evident to us that this would not present any difficulty. We could, if we wished it, reach the crest of the mountain without any rock-climbing at all, but, as we were not yet certain which part of the crest was the real summit, and in order to avoid a tedious tramp over the snow, we determined to climb straight forward over the terraces of snow and rock which lay before us. In this, also, we met with no difficulties, except that at the higher altitudes the rocks were in places coated with ice and covered thinly with snow, so that caution was always advisable. After a climb of barely an hour and a half, we reached the crest and could look down the gigantic perpendicular wall which forms the east face, into the depths below. The highest point lay farther to the north. We followed the ridge upwards over erratic boulders and snow, and at a quarter to ten were standing on the summit of Mt. Daly. We found it to be a snowy dome with a cornice deeply hollowed on its east side; but by climbing down a few feet to the cliff on the north face, we could erect a small cairn.

It was one of those glorious days which are calculated to make the mountain-climber forget all the little worries and dangers of his calling. Not a cloud was to be seen in the deep blue vault overhead; no haze dimmed for us the panorama, as sublime as it was beautiful. Above all, our eyes were attracted to the wide-spread snow-fields lying far below, whose immense extent lent an almost arctic character to the landscape. Southward the giants of the Bow and the Ottertail ranges, Victoria, Huber, Lefroy, Hungabee, and many others, soared upwards to the sky; in the foreground rose Mounts Cathedral and Stephen; farther to the west towered the triple-peaked massif of the haughty Goodsir, one of the loftiest and grandest of the mighty company. Northward a seemingly endless series of summits in glittering armor of snow and ice shut out the horizon. Among these Mount Forbes especially attracted our notice, bringing strongly to mind by its general shape and formation the Dent Blanche in the Swiss Alps.

All too soon we were compelled to tear ourselves away from the contemplation of this picture so full of light and beauty, for we did not know what might be lying before us and had to be economical with time. Our descent lay over the snow-slopes we had avoided in the morning. The going was uninteresting to a degree which induced Professor Fay to try a glissade. All went well at first, but presently he encountered an obstacle, lost his balance, and shot with more speed than dignity into the depths below. Nevertheless, he reached bottom in safety and at a respectful distance from the next crevasses, and could await us at his ease. At about half past ten we found ourselves once more assembled at the spot where we had left our packs, shouldered them, and resumed our course in a westerly direction over the snow-fields.

The Yoho Valley formed, as already related, our second objective, and how we should reach it was the question that now engaged our attention. We knew that on our side the valley was shut in by a wall of rock about 1500 feet high; over this the Takakkaw stream tumbles, draining the glacier upon which we stood, and forming one of the highest waterfalls in the world. There was nothing to tell us on which side of the fall we should find the easiest face of the gigantic precipice; we could get no view of how the land lay, and, on account of the ice-fall, were obliged to come to a decision while still high up on the glacier; we chose, therefore, at haphazard, the southern side. The snow was in good condition, not too soft, so that we soon reached the dry glacier. We now proceeded over the ice itself, and then, on approaching the edge of the icefall, passed over to the southern moraine, and, lower down, on to the enclosing cliffs of the glacier. The rocks were highly polished, and consequently offered a certain amount of difficulty. Evidently this glacier also was much shrunk. At last, at about one o'clock, we reached a strip of forest which bounded the upper end of the valley. We had really meant to rest here, and Bohren brandished the coffee-pot suggestively; but the rest of us were desirous of making an end to the uncertainty of our position, and therefore preferred to continue the descent forthwith, especially as there was no potable water in the vicinity. We were soon at the lower border of the forest, and could look around us. At our side,

the torrent shot clear over the edge of the precipice into the valley below, there to be transformed into a great cloud of mist; deep in the abyss we could hear its waters thundering. A less pronounced roar came from the narrow canyon which the stream has cut as a profound sluiceway from the ice-foot to its final plunge, within which a cascade of fully a hundred feet in height churns the muddy torrent into whiteness, and prepares it for its more portentous leap. From where we stood a magnificent scene lay unrolled before our eyes. At a dizzy depth below stretched the verdant length of the Yoho Valley, the river winding like a narrow silver ribbon through it; on the far side sombre forests, dazzling patches of snow and the gray-brown declivities of the Emerald range showed in effective contrast. But the crowning glory of this Canadian Yosemite was the Takakkaw Fall. The sun blazing down upon the ice had caused a great increase in its volume, and it was now incomparably grander than any of the falls in the Sierra Nevada. As will soon be seen, we had no grounds for rejoicing over this superiority.

Our attempts to descend, which we now made in the neighborhood of the falls, were everywhere defeated by the immense difficulty the slippery face of the precipice offered. Upwards and downwards we climbed about the upper edge of the cliff, seeking a practicable way, but finding none. We were already not a little weary, and the possible prospect of having to climb up to the glacier again was not calculated to raise our spirits. At last Häslér discovered a ledge, devious and in many places discontinuous, leading along the face of the rock in a southerly direction, and apparently ending in a precipitous couloir; that we should at any rate investigate this, was self-evident. We started down. The first few yards were easily negotiable, but then the ledge began to assume in width and inclination the appearance of a window-sill, whilst at the same time the cliff above bulged outwards. There was nothing to hold on to, and, if there had been, it would not have been of much use to me, as I had damaged my left hand. The danger of brushing against the overhanging wall with our packs, and losing balance, added not a little to our difficulties. In short, the situation was far from pleasant. There is no better sport than mountain-

climbing as long as one has elbow-room and no pack to carry ; but here we more resembled a string of lame cats creeping along a gutter than anything else. I have in remembrance one spot that was specially unpleasant. The ledge had here a considerable outward as well as downward slope, and was strewn with small stones ; the slightest mistake, as foot by foot we felt our way slowly down, would have been fatal. Beyond this came one more corner where the ledge almost wholly ceased ; but after that it widened out again. Immediately afterwards we reached our goal, the aforesaid couloir. Without pausing we scrambled down it, and, gaining its mouth, raced down over the slope of débris at the foot of the precipice.

At three o'clock punctually we called a halt by the bank of the Yoho River, almost at the spot where it is joined by the Takakkaw, to rest and drink something supposed to be tea, but which more resembled pea-soup—the result of an intimate union of tea and the remains of some preserved soup in Häler's knapsack. Then we reconnoitred our position, and came to the conclusion that it was by no means encouraging. In our front flowed the turbulent river, which had become so swollen in consequence of the hot day that an attempt to cross without the help of a bridge was not to be thought of. True, we had the requisite tools with us, and might have been able to throw a temporary bridge across, but far and near there was in sight no tree of the necessary size for such a purpose. There was nothing for it, then, but to try to follow the river to its junction with the Kicking Horse, in the hope that we should be able to cross the latter without much difficulty. Of the nature of North Fork Valley, along which our way would lead, at least of the valley on our side of the river, nothing at that time was known ; above all we were in blissful ignorance of the truly awful canyon which lay before us.

At half past three in the afternoon we broke up our camp. In the beginning all went well, the bottom of the valley being level and the forest growth scanty ; but the scene was soon to change. In front the cliffs drew closer together to form the at first only moderately elevated walls of a channel through which the river forced its tumultuous way. We entered the gorge, and scrambled along the side of a precipice growing ever higher,



LOWER YOH0 CANYON.

THE BIVOUAC.

THE CLIFF PATHWAY.

From photographs by Eduard Towe.

and soon found ourselves in a canyon whose depth was to be measured in hundreds of feet. The possibility of such an obstacle had not entered into our calculations, but we hoped we were dealing with a merely local formation. In this we greatly erred. The scenery became wilder and wilder; down below, the river tumbled and foamed over rocky ledges and through narrow passages, and on both sides perpendicular cliffs, diminishing the waning daylight, notably increased the dismal aspect of the place. We had no eyes for the grandeur of the scene. At one time we would be hanging high up on the face of a cliff, at another we were clambering painfully, and drenched with spray, along the torrent's brink. There were places where the rocks, slippery from the constant wash of the river, would have been awkward climbing anywhere, and here a false step meant certain death in the racing turmoil of waters.

Hour after hour passed, night overtook us, and we were still in the canyon, out of which it almost seemed that we should never find our way. The situation was getting really serious; in half an hour at most it would be quite dark, and what to do, if we could not by that time find a place in which to pass the night, was a question not easy to answer. We could not, unfortunately, stick to a perpendicular surface and sleep like flies. At last — it was close on nine — to our relief we found what we were seeking. A part of the cliff had slid down, and formed a reëntrant angle at a steep incline ending high above the river and covered with rubble and more or less of shrubbery. A little rill flowing down it supplied us with water. So the spot, by an effort of the imagination, might be considered as a possible sleeping-place. We scraped a small, level spot with our axes behind a twisted, weather-beaten pine tree, passed our rope round the latter to make a support for the legs, and covered the whole with pine branches. We had next to solve the problem how five might be accommodated in a place which would have been uncomfortably circumscribed for three. We succeeded at last in stowing ourselves after the manner of sardines in a tin. It was by no means warm, and the nature of our night's rest, immediately above the rushing stream, can be imagined.

We were astir betimes next morning, but had to delay our start till the sun should be high enough to light our dubious path-

way. In the mean while, we occupied ourselves in cutting into small pieces something that once had been chocolate, but which, by some chemical process during its sojourn in my pockets, had become changed to a nameless mass; a compound resulted whose only claim to be regarded as a beverage was that it was fluid. About six o'clock we bade farewell to the hospitable spot, and set out upon our way again.

We clambered and scrambled for another hour and a half, and then the canyon began to open out, the cliffs drew apart, and the river flowed with a wider and smoother current. For a time we made fairly easy and rapid progress. Then the valley became clothed with forest, and once more we had our work cut out for us.

A typical specimen of primeval Canadian forest bars the exit from North Fork Valley. Thousands of years in all probability have come and gone before it has attained its present appearance; countless generations of trees have grown up, flourished and died down to make way for successors who in their turn should undergo the same fate. And all these dead bodies of trees lie in the most incredible confusion, in the most extraordinary positions, over and under each other, choked by a rank growth of creepers, underwood, and moss, and forming a desolate chaos above which the living trees, often giants of the hugest size, tower aloft. As may be understood, the making of one's way through such a wilderness must be coupled with difficulties as to the character of which those who have never traversed a British Columbian forest can form no conception. It is a ceaseless battling against a vegetation of unequalled luxuriance, with dense undergrowth, dripping boughs, thorns, wasps, and rotting tree-trunks, a never-ending climbing and springing, now uplifted on a giant moss-grown stem, now creeping humbly in the dust, whilst the hours go by, and the twilight-shrouded forest stretches endless before you. The senses soon lose all consciousness of the wonder and awe of this prodigious growth, where the living and the dead lie side by side; and the mind, through the monotonous and continuous toil, surrenders its powers of observation. It is on occasions like this, in the backwoods of the Far West, that I learned the full forcefulness and variety of expletive which three languages are capable of producing.

At last, somewhere about 11 A. M., the welcome sound of running water in a new key fell upon our ears, and soon after we were standing on the banks of the madly foaming Kicking Horse. Before us swept the narrowed river, boiling and seething between two walls of rock; to our joy it was no longer an obstacle, for a fallen tree-trunk lay spanning the stream, just grazed by its spray and swirl. We roped ourselves together, and, affectionately hugging our well-soaked bridge, crept safely over, not of course without a complete drenching. In a short time we were standing on the far side, with only a stretch of living forest and of fire-swept wilderness between us and the railway, where we finally arrived, torn and tattered, and quite worn out.

A locomotive happening to come along from Kicking Horse Pass, we signalled it to stop, and mounted cow-catcher and tender. A rapid run down the winding track from the "second switch" brought us in a short time to Field, the starting-point of our expedition.

High Pioneer Ascents in Baltistan.

BY WILLIAM HUNTER WORKMAN, F. R. G. S.,
Member of the American and English Alpine Clubs.

Read October 8, 1904.

DURING the summers of 1902 and 1903, while exploring the upper portion of the great Chogo Loongma glacier and its tributaries, we made our base camp on a rock promontory projecting into the glacial ice-stream at the confluence of the Haramosh glacier with the Chogo Loongma. This camp was situated at an altitude of 14,000 feet in a region of rock, snow, and ice, a day's march above the smallest scattered tree growth. This was the headquarters from which we started out on our expeditions, as the weather permitted, to the higher neighboring regions, and to which we returned when these were completed, or when driven back by stress of weather. Here were collected all our supplies and outfit. Here the coolies built for themselves with slate slabs, which lay around in abundance, huts in the crannies of the rocks, and a busy village soon arose on a spot previously inhabited only by the wild fox. Gangs of coolies were occupied in bringing firewood from the hillsides further down the glacier

and food for us and themselves from Arandu, where these were delivered from the villages in the valley below. Here also our mail was brought by dak or post coolies in our employ, who were kept constantly on the route between this camp and Skardo, the last post-village, seven marches distant.

Time at this camp never hung heavy on our hands, even when, as was the case for days together during both seasons, we were storm-bound; for there was plenty of work always to be done in making observations, writing up notes, developing negatives, making repairs and preparations for further movements, and looking after the thousand and one matters that pertain to the organization of a mountaineering and exploring expedition that employed from eighty-five to one hundred coolies.

Soon after our arrival in 1902 three magnificent snow peaks soaring up from an ice-clad mountain ridge, which formed one of the barriers of the upper arm of the Chogo Loongma, attracted our attention, and we determined, should weather permit, to attempt their conquest. We dared not hope to conquer the highest, which pierced the blue at an elevation of 24,500 feet or more. To ascend this would necessitate camping at from 21,000 to 22,000 feet among the tumbling ice-falls, a proposition which we knew the coolies could never be brought to attempt, and which in any case could only be thought of during a prolonged period of the finest weather, which we were not likely to get. But we hoped to be able to scale the two lower summits, which were sufficiently high and difficult to satisfy the ambition of any ordinary mountaineer. During the summer of 1902 the weather was so continuously bad that no opportunity to carry out our plan presented itself. There were only two or three consecutive pleasant days. We made reconnoissances, however, around two sides of these mountains in the course of our exploring work, ascended a peak of 17,814 feet and a col of 19,260 in their neighborhood, and gained a fairly good idea of where they could and could not be attacked.

Fortified with this information and provided with additional mountain outfit suggested by our experience of 1902, we returned to our base camp early in July, 1903, determined to seize the first favorable opportunity to lay siege to the ramparts, which beckoned to us so enticingly from above. The latter half of



UNNAMED PEAK (24,500 FT.) AT THE HEAD OF CHOGO LOONGMA GLACIER

From a photograph by Dr. and Mrs. Workman.

July and the first week in August we lay storm-bound in our camp most of the time, with everything ready to start as soon as the weather should take a decided turn for the better. Favorable intervals of two or three days we employed in expeditions into the glacial world around, which added material for our map and some interesting information of scientific interest.

At last, on the eighth of August, the storm-king appeared to have spent his rage. The barometers rose and the skies cleared. The three peaks stood out white and glistening in their mantle of newly fallen snow, seeming to nod to us and say, "Now is your time, *carpe diem*."

Everything was made ready. The coolies who were to go with us were ordered to cook three days' rations for themselves; and twenty picked men were selected to carry our impedimenta, consisting of one warm eight by eight mountain tent, four flannel-lined Mummery tents, a week's food supply for us, sleeping sacks, warm clothing, ropes and climbing outfit, two Primus stoves, petroleum, and two coolie tents. Two other coolies were to go to the first camp with rations for their confrères. Our khansamah was instructed to despatch four more coolies with additional supplies under charge of one of our Gurkhas on the second morning after our departure.

On the ninth of August, at five and a half o'clock, when it became light enough to pick our way through the sérac belt, which guarded the approach to the camp, we started with one camp servant and the twenty-two coolies, the Europeans of the party consisting of Mrs. Bullock Workman, myself, the two guides Petigax and Savoie, and the porter, Petigax *filis*.

The ascent of the mountains really began at this camp, since after leaving it we were always on ice and snow, and the path was always upward. We passed through the séracs without any great difficulty, crossed the Chogo Loongma to a large ice-fall about three quarters of a mile long, with which a tributary glacier named by us Basin Glacier joined the Chogo Loongma. This glacier, which we had explored in 1902, led directly up under the precipitous slopes of the peaks, which were our objective.

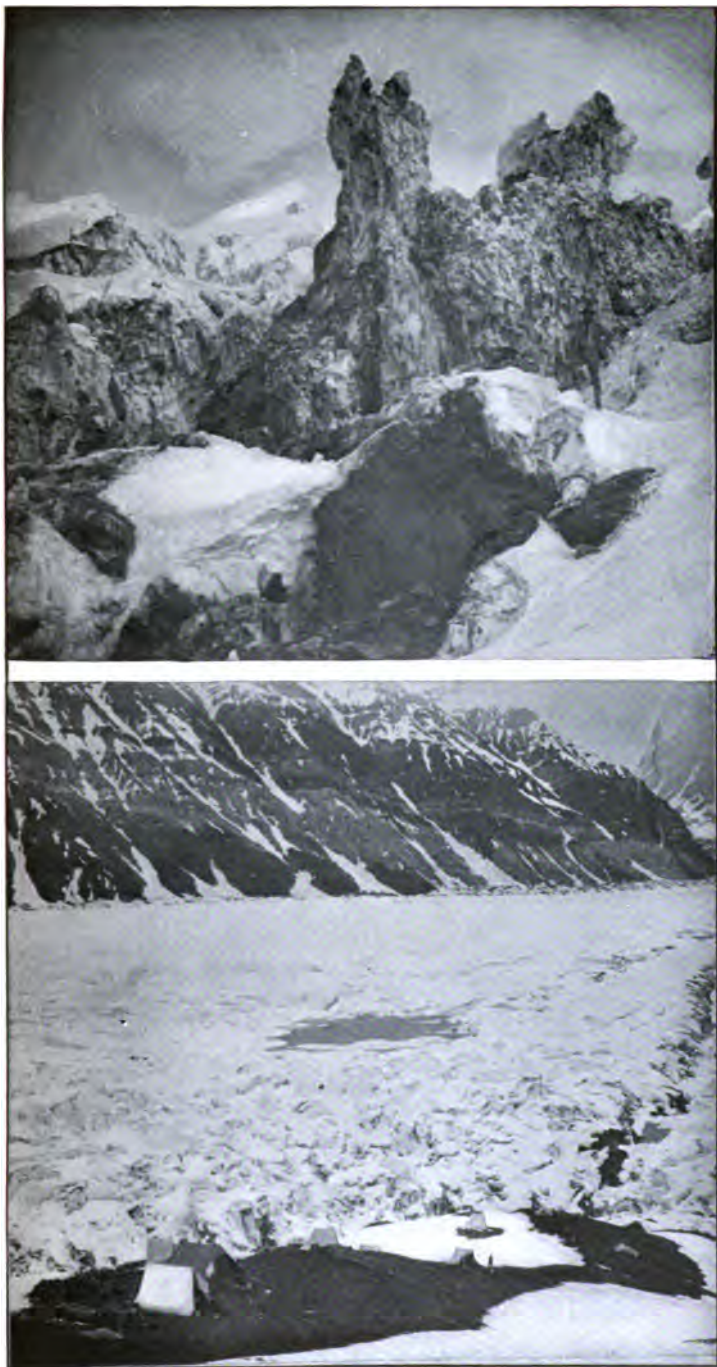
As the ice-fall was impassable, we scaled the steep snow-covered mountain sides bordering it, and got upon the glacier

above. From here the glacier, which was quite smooth, afforded an excellent path for the rest of the day, except for the soft snow, which grew deeper as we ascended. We encamped at 1 P. M. upon the glacier near its head in eighteen inches of snow, under the flanks of the first peak, at an elevation of 16,351 feet. Directly opposite on the other side of the glacier rose the steep and dangerous avalanche-scored wall of the Bhayákara La, which we had climbed in 1902. As we looked at its furrowed slopes we were thankful we were not obliged to do it over again.¹

At daylight on the tenth we were again in motion. Directly from camp we began to ascend the sharp flank of the mountain, which fell in a continuous series of broken ice slopes from summit to base. Our route, as we made it, traversed some of these and zigzagged up others, with frequent détours to find snow bridges over the appalling crevasses, which seamed the mountain in all directions. For the first two and a half hours the snow was hard, and we made fair progress, though the coolies wanted to rest much oftener than we wished, and we had to urge them constantly. By eight o'clock the heat of the sun, which burns with fiery fervor at these altitudes, had softened the snow appreciably, and we began to sink in every few steps, at first to the knees and later to the hips. This rendered progress slow and fatiguing.

We had now to urge the coolies on with redoubled earnestness and help them as well, and all our exertions were required to keep them up to the work. Some of them murmured a good deal, but there was no open insubordination. We kept them on the move, and about one o'clock reached a small fairly level snow plateau at a height of 18,811 feet, where we decided to camp. We wished to go some five hundred feet higher, but, as the coolies had had a fatiguing climb of seven and a half hours, we considered it advisable not to push them further. The soft snow here had to be trodden down as usual to make places for the tents. We had scarcely pitched the latter when the wind rose, the sky darkened, and we were enveloped in a snow squall, which threatened to tear the tents from their rather insecure moorings. This soon passed, and the sun shone again with full power in a clear

¹ See APPALACHIA, vol. x. pp. 252-255, and *Alpine Journal* for February, 1904.



SERACS AT JUNCTION OF CHOGO LOONGMA AND BASIN GLACIERS.
RIFFEL CAMP AND CHOGO LOONGMA GLACIER.

From photographs by Dr. and Mrs. Workman.

sky, causing the mercury in the solar thermometer to rise to 192° Fahrenheit.

We were up at three o'clock on the morning of the 11th, with bright moonlight, for we intended to start the caravan for higher regions at five. At four the servant was sent to call the coolies, whose tents stood at a distance of some five hundred feet from ours. Half an hour later he brought word that the coolies refused to get up. Our tents were struck and all our effects were packed ready for the start.

We did not propose to stand shivering on the snow in a freezing temperature at an altitude of nearly 19,000 feet awaiting the caprice of the coolies, and we further knew that this open disobedience of orders, if tolerated even for a short time, would put an end to discipline and result in a failure to get any of the peaks. Savoie and myself therefore descended to the coolie camp at once, and found the coolies all snugly ensconced in their tents, not a man having stirred. Without any ceremony we tore their tents down about their ears, and commanded them to put on their boots and get ready to march. Our determined attitude had the desired effect, and by six o'clock, one hour late, we had them loaded and started off. They did not march well on this day, and required constant urging. The slopes were steep and the new snow was knee-deep.

We wished to traverse the flank of the first peak and camp, if possible, at a height of about 21,000 feet on the plateau from which the second peak arose. Mrs. Bullock Workman, with Petigax, the porter, and her coolie, led the way, whilst Savoie and myself remained with the baggage coolies to apply the *vis-a-tergo* necessary to force them on. In assisting them over a steep bank flanking a crevasse, my topi was struck from my head by the stick of one of them, and bounded down the steep slant with lightning speed several thousand feet to the glacier below, where it now reposes. Till we got into camp several hours later, my head had no protection from the burning rays of the sun, except that afforded by a light shawl, and the effect of this exposure manifested itself the next day in a severe headache, handicapped by which I performed the final arduous ascent of over 4000 feet.

Mrs. Bullock Workman and her party soon distanced the

leaden-footed coolies, and at nine o'clock were some five hundred feet above the caravan and nearing the brow of the upper plateau at a height of about 20,000 feet, when the expected defection of the coolies occurred. Half a dozen of them, severely affected with mountain sickness, threw themselves down in the snow and lay like dead. All endeavors on our part, short of actual violence, to induce them to move on were unavailing. The others now refused to go further, and no amount of coaxing, threats, or offers of six times their daily pay had any effect to make them go even five hundred feet higher to the plateau above. We were therefore obliged to recall those in advance; and, as there was no place to camp here and we were in the track of avalanches, which might fall from an overhanging ice-wall just above, we reluctantly turned back and camped at the base of the first peak at an altitude of 19,358 feet. It was now evident that our camp could not be forced any higher, that we could expect no further service from the coolies, and that we must make the remainder of our ascent from this point over the only available route to the higher peaks up the sharp broken slants of the first peak to its summit, which route we had sought to avoid altogether by camping higher up.

The afternoon was spent in such preparations as were necessary for the next day's work, while Savoie and Petigax *fil*s trod out steps in the then softened snow for more than a thousand feet up the side of the peak. We went to bed early, but did not sleep well. As soon as we began to doze and the respiratory movements diminished in number and force, the tissues did not get an adequate supply of oxygen in that attenuated air, and we would awaken with a start gasping for breath. All the party were affected in the same manner. This did not tend to fortify us any too well for the coming struggle, fatigued as we were by three days of hard climbing.

At two o'clock on the morning of the 12th we were astir, and at three Mrs. Bullock Workman, myself, the two guides, porter, and two coolies especially equipped with nailed boots and warm clothing, set out by the light of the moon at the beginning of the last quarter, in a temperature of 15° Fahr., with a light north wind. We started directly up the steep pyramid before us on the snow now hard frozen, zigzagging and traversing as the

nature of the inclines demanded. At one place we had to make a long traverse of a slant of nearly seventy degrees just above a perpendicular snow precipice, the bottom of which could not be seen, which appeared all the more gruesome in the uncertain moonlight. Near the middle of this traverse two crevasses running perpendicular to our course had to be crossed, which we were just able to jump. But little was said, and we pressed steadily upward in the sugary snow. We were anxious lest our feet, which suffered severely in spite of heavy mountain boots and stockings, should be frozen. As long as they were painful, we felt they were safe, and we beat them often with our ice-axes to keep up the circulation. High peaks rose around us like shadowy sentinels of the night, ghostly witnesses of our temerity in thus invading their untrodden domain, but they were silent and offered no remonstrance in the shape of avalanches to voice their displeasure. Toward the top we encountered some exceedingly steep slants that caused us to tread cautiously and pant for breath. Just before sunrise the cold was hardest to bear. At 7.15 we stood upon the apex of this peak, a narrow snow cornice, that at an altitude of 21,500 feet overhung a sheer precipice of several thousand feet, falling away to Basin Glacier, from which we had ascended. The temperature here was 16° Fahr., and there was but little wind.

Of the glorious sunrise presaging a perfect day, we will not speak. Stopping about half an hour to take a little food, expose some plates, and read our instruments, and leaving one of the coolies who here gave out, we set out for the second peak, descending one narrow snow arête and crossing a second to get upon its flank. The slopes of the second peak were not so sharp as those of the first, and its ascent was only a question of endurance of the effects of high altitude and of the fatigue incident to moving upward in snow about ankle deep.

By ten o'clock we were within twenty minutes' climb of the top. Here the party separated. Mrs. Bullock Workman, the porter, and coolie, went on to complete the ascent of this peak, and reached the summit at half-past ten. This was found, like the first, to be a cornice overhanging a precipice, and the readings showed its altitude to be 22,568 feet.

Petigax, Savoie, and myself started for a point apparently

about a thousand feet higher, on the southwest arête of the third peak, which commanded a view toward Hunza-Nagar. This third summit, the highest in the region, loomed up white and sharply defined ahead, towering to a height of 24,500 feet or over. We ascended over the long rising snow plateau leading to it, and after an hour stood at its base, from which a long snow arête as steep as anything yet encountered rose in an unbroken line to the summit, which, like the two already won, consisted of a vast cornice overhanging a tremendous precipice of some seven thousand feet, with which the mountain walled in the upper end of Basin Glacier.

Leaving all unnecessary baggage, we attacked this arête, and after some rather stiff work in zigzags, reached the spot selected on it at 12.30 P. M., having had nine and a half hours of almost continuous climbing. Calculations based on the readings here taken compared with those taken at the same time at our measured lower station give the altitude of the point attained as 23,394 feet. We never for a moment entertained the idea of attempting to reach the summit, which still towered some twelve hundred feet or more above us. Above 17,000 feet, two thousand feet and return to camp is considered a good day's work. We had already done more than double this amount, and made, I believe, the longest high climb on record besides attaining a record altitude.

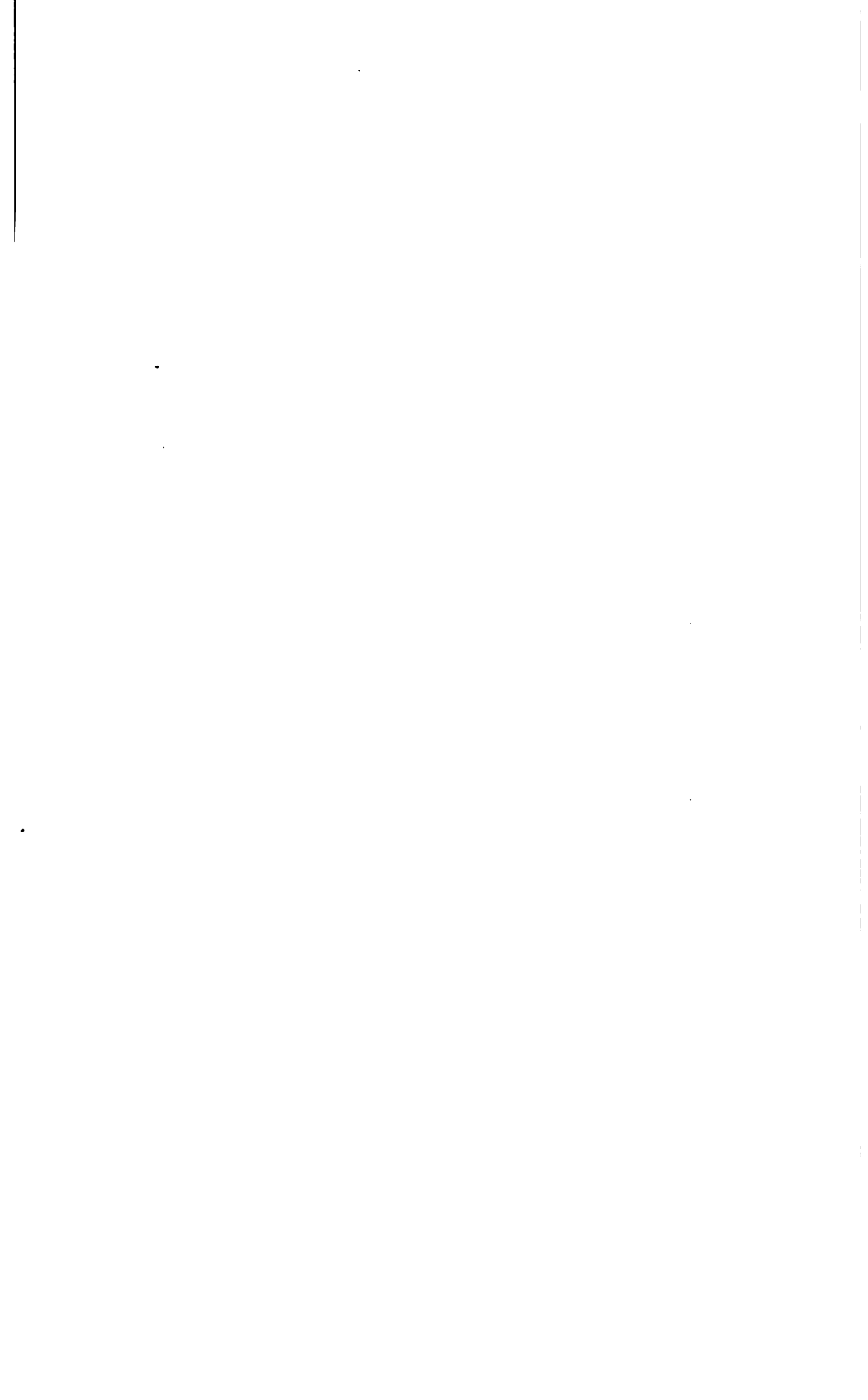
It is possible we might in the course of the afternoon have reached the top; but the peak would have been our gravestone, for we could not have regained camp that night, and a night in the open at that altitude would have meant certain death from cold, to say nothing of the danger from fatigue. Could we have encamped, as we tried to do, at over 21,000 feet, the whole party would, in all probability, have gained the summit at 24,500 feet, as the day was windless and perfect, — such a day as we had not had in the whole season preceding. Had the weather not been fine, or had a wind of ten or fifteen miles an hour blown against us, we should not have reached the second summit. We had seized and utilized as far as possible the only opportunity in two seasons.

The view from this point was indescribably grand and extensive. Over the space of three quarters of a circle countless thou-



MT. CHORO (21,500 FT.) AND MT. LOONGMA (22,568 FT.)

From a photograph by Dr. and Mrs. Workman.



sands of spires of every size and shape shot up in the sky, as far as the eye could reach. We could see from Nanga Parbat, sixty miles away in the southwest, to Gusherbrum and Masherbrum, eighty miles distant on the northeast. Prominent between these were the well-known forms of the Mustagh Tower and K 2, and nearer our old friends, the Biafo giants. Beneath, stretching away for thirty miles, banded by its remarkable curving medial moraines, was the Chogo Loongma glacier. The Pratap Singh La, 20,000 feet high, at its head was clearly outlined as the beginning of a snow-pass running to the northwest for perhaps three miles between high snow-peaks, and then falling away to a glacier, which ended in a valley stretching out in the direction of Hunza-Nagar. In the foreground, across the Chogo Loongma stood the beautiful snow-needle of the so-called "Hunza-Nagar Watershed Peak No. 4" (22,810 feet, measured by the Indian Survey from a distance), the summit of which was considerably below us. Above it, and ten miles behind it, rose the imposing form of Mt. Haramosh, 24,283 feet, and in the distance, bounding the horizon, the immense mass of Nanga Parbat, 26,629 feet.

After remaining half an hour to take readings, photograph, and gaze upon such a view as in a long mountain experience we had never before seen, — the one view of a lifetime, a view to enjoy which for half an hour was only an aggravation, — we reluctantly started downward to rejoin the rest of the party on the second peak, which we reached at 3 P. M. Here the view was nearly as imposing as that from above.

After another half-hour's rest we all left the second peak to descend to camp, which must be reached before darkness set in, as the dangerous slopes of the first peak could be safely negotiated only by daylight. Picking up the second coolie on the summit of peak 1, where he had contentedly sat the whole day, we regained our tents at 7 P. M., after sixteen hours of by no means easy work, just as the short twilight was deepening into darkness. We had a good deal more interest in our sleeping-sacks than in food, and without a ceremonious meal we turned in for the night.

The two peaks actually conquered we named Mt. Choro (21,500 feet) and Mt. Loongma (22,568 feet). On the whole we felt repaid for the two long periods of waiting and the hardships we

had endured. We had been just in time. The next morning at daylight, by falling barometer and with clouds rolling across the sky, we struck tents, and descended as fast as possible to our base camp. Before we were half-way across the Chogo Loongma we were enveloped in a snow storm. When we came to the séracs, which in any case would be difficult to pass in the snow-darkened air, we found the bridges, by which we had crossed five days before, destroyed by the movement of the glacier, and we had to seek a new route through the labyrinth of giant ice-pinnacles separated by profound crevasses. This constituted to my mind the most dangerous part of the whole excursion, and I was thankful when we stood once more on the promontory and were pitching our tents in their accustomed places on the snow-covered terraces.

Glacial Erosion in the Sawatch Range, Colorado.

By W. M. DAVIS.

EARLY in July, 1904, while on the way to Utah, I stopped in the upper valley basin of the Arkansas river in Colorado and made a short excursion with my companion, Professor L. G. Westgate, of Wesleyan University, Delaware, Ohio, to that part of the Sawatch range which drains by Lake creek into Twin lakes and thence into the Arkansas. The river here flows south-southeast through one of those open basins that occur so frequently in the Rocky mountains; the lofty Sawatch range rises on the west with a number of peaks exceeding 14,000 feet in height; the somewhat less elevated Park range is seen on the east. At the southern end of the basin, the river turns eastward through the famous Royal gorge in the Front range, and then flows out upon the Plains.

This excursion gave me a return to a field that I had seen in 1869, when a small party of students was led there by my teacher, Professor J. D. Whitney, and two of the "College peaks," Harvard and Yale, were climbed and measured. The fine moraines formed in the valley-basin by the ancient glaciers that advanced eastward from several of the valleys between the peaks of the Sawatch range were then recognized, and the beautiful Twin lakes, occupying morainic basins, were soon

afterwards described in one of the reports of the Hayden survey; but in those early days there was little or no understanding, in this country at least, of cirques, hanging branch valleys, and spurless main valleys as products of glacial erosion. It was these significant features that we went to look for this year.

My own belated appreciation of glacial erosion in mountain valleys is briefly set forth in an account of some features in the valley of the Ticino — the part called the Val Levantina — in the southern Alps, published in *APPALACHIA* a few years ago. Many other accounts of cirques and hanging valleys as the products of glacial erosion might be mentioned to show how widespread is the occurrence of these remarkable forms, but three must here suffice: Gilbert's description of glaciers and glacial erosion in the third volume of the Harriman Alaskan Expedition reports; Penck and Brückner's monograph on *Die Alpen im Eiszeitalter*; and Andrews' studies of the New Zealand Alps. It thus appears that glaciated mountains in many parts of the world are, as far as interrogated, practically unanimous in their testimony on this hitherto mooted question, and the Sawatch range, the last witness that I have had a chance of cross-questioning, is as positive in its answers as are the others.

We left the train at a small village, Granite, where both of the valley railroads, the Rio Grande Western and the Colorado Midland, have stations. Here the Arkansas river has been locally displaced eastward from the axis of the valley-basin by the ice and moraines of an early glacial advance from the high mountains on the west; and as a result it has cut a gorge in the granite at the base of the eastern slope. Professor Westgate's report on this district, to which he returned for a month after our Utah trip, will make it clear that the displacement of the river occurred early in the glacial period, for the gorge is now opened so wide that its weathered walls are seldom too precipitous to climb. A few hours before sunset on the afternoon of our arrival gave us time for a brisk walk over the upland to a knob about three miles to the southeast, whence a fine view is had of the great moraines that were formed in the main valley basin by the Clear Creek glacier, which came from a deep valley on the west, next south of the Twin Lake valley. Early the next morning we went by stage to the Lakes, and spent

the day rambling in the valley of Lake creek. A second day was given to the southern slopes of Mount Elbert, whose domed summit is the highest of the range, 14,436 feet. We thus gained excellent local and general views of a considerable part of the area once occupied by the trunk and branch glaciers of the Twin lakes system. The appropriate distribution in this area of features due to glacial erosion and deposition is most striking. It well deserves more monographic study than the brief account that I can give. But first there is another matter to set forth.

How is an observer led to conviction in a matter of this kind? This aspect of scientific inquiry has always interested me greatly; and in the hope that it may interest others, a brief exposition of the road that leads to conviction may be made.

Let us suppose that a traveller enters the Rocky mountain region with an open and inquiring mind, but uninformed on the question of glacial erosion. He might say to himself: "Ancient glaciers are said to have left large moraines in the upper Arkansas valley-basin. I wonder if the glaciers caused any significant change in the form of the mountains. Evidently, if they were not competent to deepen the valleys that they occupied, there should be no features here essentially unlike those of non-glaciated mountain ranges of similar height; but if on the other hand, the ancient glaciers were effective eroding agents, these mountains should exhibit forms appropriate to erosion by valley glaciers, and they should be to that extent unlike mountains whose sculpture has been altogether accomplished by the normal agency of weather and water, of rain and rivers."

So far, so good; but this is not far enough. The traveller ought to go farther and say: "The forms produced by persistent normal erosive agencies in non-glaciated, maturely sculptured mountains are familiar from certain examples. The valleys are proportioned to their streams, although the streams occupy a very small part of the valley cross-section. Like the streams, the valleys ramify, becoming slender ravines toward their heads. The slopes of the valley floors increase in steepness nearly to the divides on the mountain crests. The valley sides descend with graded slopes of much regularity to the valley bottom. The valley floors join at grade at points of confluence. Each main

valley path is somewhat irregular, and the view along it is soon closed by the overlapping spurs that project forward between lateral ravines. But what would the valleys of vigorously glaciated mountains look like?"

Here the traveller ought to recognize that he is entering on a complicated problem, involving many variables; for it is evident that the existing forms of glaciated mountains must vary not only with the competence or incompetence of glaciers to erode, but also with the stage of development reached in pre-glacial time, with the duration as well as with the intensity of glacial erosion, and with the amount of normal post-glacial erosion. Let the traveller therefore simplify his work by taking one case at a time. He might begin as follows: "Suppose that these mountains had been maturely dissected by normal agencies in pre-glacial time, and that vigorous glaciers then occupied the valleys for a period sufficient to make their work distinctly unlike water-work, and that they disappeared so recently that no great modification of their work has yet been accomplished by the normal agencies of post-glacial time."

At this stage of the inquiry, a well-defined problem is conveniently stated, but it is not solved. It still remains to discover what peculiar forms should be expected under the provisional supposition that strong glaciers of the Alpine type are competent eroding agents. There is no one accessible from whom the traveller can ask advice or assistance; there are no books to be had. Shall the traveller abandon the inquiry with the mere statement of one of its special cases, or shall he continue to push forward with an active mind behind observant eyes? My preference is decidedly for the traveller who continues to ask himself questions as long as any questions remain to be asked. We may imagine him to proceed in this fashion: "I don't remember anything about this in the text-books, but if the glaciers that once occupied these valleys really did erode, their channels ought to have come to make a much larger part of the cross-section of their valleys than stream channels would. The headward ramification of the channels ought not to be carried to so slender a system of branches as in the case of stream channels. The channels, now evacuated, should show rather steep and even banks and somewhat uneven floors, being thus similar to but of

much larger scale than stream channels, so large indeed that they might be called 'valleys' and their character as channels might pass unrecognized. Where a small branch glacier had joined a trunk glacier, the beds of the evacuated channels should break joint, and the bed of the lateral channel would be left 'perched' or 'hanging' above the deeper bed of the trunk channel. Terminal moraines should remain around the lower end of the trunk glacier, containing as much of its load of detritus as was not swept away by the ice-water stream. Evidently, the perfection of these various features may be taken as a measure of the efficiency and success of the ancient glaciers in establishing a satisfactory ice-drainage system. Of course, while all this work was in progress, the processes of normal erosion on the super-glacial mountain slopes cannot have been idle; and the retrogressive erosion at the blunt heads of the glacial tributaries must have caused a greater and greater undermining and consumption of the main mountain summits. . . ."

Alas, no traveller ever carried his deductions as far as this! The scheme of consequences here stated, simple and manifest as it really is when well apprehended, is not the result of a single continuous effort of inference, such as our traveller is supposed to have made: it is the accumulated product of many students' work through many years of inference, spurred on and tested by many years of observation. No, the traveller cannot be fairly supposed to have thought out the problem on a single journey: but he might, before starting, read up the available discussions of the subject; he might sort out the inferences from the observations; and thus equipped he might enter a new field and attempt to judge as impartially as possible how far the inferences are supported by the facts. Thus he could gain new and independent evidence as to the competence of glaciers to erode or not. This was the agreeable task that we carried out west last summer; and the pleasure and profit of the excursion were both greatly increased by the preparation we had made for it. We not only saw fine illustrations of mountain and valley forms, we not only found that they admirably confirmed the general scheme of glacial erosion as set forth by Johnson, Gannett, Penck, Richter, Gilbert, and others, but we felt that the critical examination of these forms as members of

a systematic series gave our visit to Twin lakes a zest that does not flavor aimless wandering, and we came away convinced that the supposition of strong erosion by valley glaciers is fully supported by the facts.

The southern spurs of Mount Elbert, at altitudes of 12,000 feet, afford many excellent views across the deep trough of Lake creek to the great mountain mass beyond, in which La Plata is the culminating peak. The trough was the channel of the trunk glacier of the Twin lake system. It is of the form that is commonly said to be broadly U-shaped in cross section, like the glacial channels described by Emmons near Leadville, not far away to the northeast; although the steep sides are by no means vertical, they are steeper than the upper slopes of the mountain, which rose above the ice-stream. Hayden estimated the ice to have been 1000 or 1500 feet thick; and the measure seems reasonable. The channel is trough-like in having no spurs enter it from either side. The spurs that separate the lateral valleys of the super-glacial slopes and the lateral valleys themselves are all cut off. The spurs do not trail down toward the main stream, but are truncated in more or less distinct triangular facets that descend to the steepened slopes of the channel sides. It is true that there are a few bold ledges that still roughen the channel sides, or "banks" of the ice stream, but they are distinctly exceptional and must be taken as marks of unfinished glacial work. Evidently the ancient glacial could not have transformed a pre-glacial water-carved valley into a typical glacial channel at a single stroke; the transformation must have been a work of time, and the period of glacial occupation was apparently not long enough for the transformation to have been complete. So with the bottom of the channel: it is not perfectly smoothed, as we might imagine the bed of a maturely graded glacier to become if plenty of time were allowed; there are irregularities such as should expectedly characterize the bed of a sub-mature, fast-moving glacier. All the ledges, on bottom and sides, on "bed" and "banks" of the glacial channel, exhibit the scouring and plucking action of ice on a grand scale. It is noteworthy that on the lateral ledges the ice scorings and the larger mouldings of form that indicate the direction of the last eroding agency do not

follow down the present slope of the channel side, but run along the face of the slope, about parallel to the general descent of the channel floor.

The rougher surfaces on the lee or down-channel side of ledges in glacial channels have often been taken for pre-glacial forms, whose scoured fellows on the stoss or up-channel side give only a moderate measure for glacial erosion ; but where all the features of a glaciated mountain district are considered together, this view seems inadmissible. The amount of channel erosion is too great for the survival of pre-glacial forms on the bottom or sides ; and the rough lee slopes of the residual ledges must be ascribed to glacial "plucking," or dragging of blocks loosened on joint planes. Similarly the knobs that stand here and there in glacial channels, and of which some good examples are found, well scoured and plucked, not far above Twin lakes, have been taken to prove the incapacity of glaciers to remove obstacles in their course ; but this argument involves two tacit postulates : one, that the knobs rose above the pre-glacial valley and that both floor and knobs have been little eroded ; the other, that glacial erosion ought to be all at once complete instead of progressive. Here again, if all the features of the glacial drainage system are considered together, it will be seen that the knobs and ledges fall in best with their fellows as residual roughnesses in the unfinished bed of a much deepened glacial channel ; had the glacier worked longer, the knobs and ledges would have been better ground down, as so many of their neighbors have been already.

It should be noted that Lake creek flows along a very irregular course in the bottom of the evacuated channel ; inequalities of rock-bed that are small in comparison to the whole channel of the heavy and sluggish ice-stream become formidable obstacles to the slender and nimble water stream. It therefore has to dodge about among the *roches moutonnées*, here flowing smoothly in a reach, there rushing and plunging down a slope. It has already cut small and narrow gorges in certain parts of its length, seldom more than ten or twenty feet deep ; and even if none of this erosion be ascribed to a sub-glacial stream while the ice still lay in the valley, and all of it be referred to the post-glacial activity of a free water stream, the time since the last evacuation of the district by ice is very short compared to

the time since the disappearance of the glaciers by which the Arkansas river was pushed over to the eastern side of its valley-basin near Granite ; for the gorge that the river has there eroded is two or three hundred feet deep, and its sides have already been described as well weathered.

Seven miles west of Twin lakes, the valley of Lake creek divides at the village of Everett into two branch valleys of about equal size, one from the northwest, one from the southwest. Large branch glaciers must have united there to form the trunk glacier which then flowed on through the range and spread out, paw-like, in the Arkansas valley basin, where its great terminal moraines were deposited. We had not time to go west to the branching of the valley, but gave our brief visit to a view of a side valley, known as Crystal gulch, that comes from the south, next east of La Plata peak. This smaller valley is the best example of a lateral glacial valley that came clearly into our field ; for on the north of Lake creek, the lateral valleys that came from Mount Elbert were on its sunny southern slope, and held no large glaciers, as far as we could see. The southern lateral valley, Crystal gulch, is about seven miles long, according to the Leadville sheet of the U. S. Geological Survey topographical map ; but the form of the valley as well as of various other elements of relief that came clearly into our field, were very imperfectly portrayed by the contour lines of this sheet, and hence we did not feel much confidence in the quantitative accuracy of the map even in the element of distances : indeed it does not seem possible that the Leadville sheet can have been sufficiently examined by a trained topographical inspector before it was accepted for publication.

Crystal gulch repeats, on a smaller scale, the trough-like channel, with broadly concave cross-section, that is shown in the trunk glacier channel. Its sides become steep, though not vertical, and higher up are the super-glacial slopes of less declivity rising to the mountain crests. The bed of the gulch shows a roughly scoured rock floor of gentle gradient, more or less cluttered over with rock slides and talus ; and near the broad head of the gulch, where it is enclosed by a great amphitheatre wall, rising for the most part in a ragged arête against the sky, the rocky bed is exceptionally uneven. But the most

notable point in the relation of the side "gulch" to the main "valley" is the discordance in the level of their floors where they come together, for the gulch is a typical hanging valley. The map shows its floor to be 300 or 400 feet over that of the main valley; but when we climbed up the northern side slope of the latter so as to gain a general view of the former, our aneroid showed the discordance to be of decidedly greater measure, and we were disposed to believe it. The abruptness of the change from the moderate gradient of the hanging lateral to the steep side slope of the main channel was most remarkable. The out-flowing creek had cut a small sluice in the side slope, and there it cascaded, half-hidden, to a fan, on which it sprawled down to Lake creek; but the sluice was a trifling affair; it made no impression on the general view, in which the discordance of the lateral and main channel beds stood out so conspicuously. In face of all this, it seemed to us impossible to doubt the capacity of glaciers to erode their channels and thus to contribute to the sculpture of their mountains.

It cannot be too carefully borne in mind that the evidence of glacial erosion thus found is not based on direct observations that disclose the actual processes of erosion. The demonstration is entirely independent of any immediate proof of glacial erosion, such as is found for stream erosion by observing the wearing action of torrents. The demonstration is found entirely in the accordance of the consequences of the purely hypothetical supposition that glaciers do erode with the facts of observation in glaciated mountain districts. If any direct evidence of glacial erosion is found at the ends of existing glaciers, so much the better, but this is entirely unessential to the present discussion. At the same time, it is well to remember that many observers have looked under the ends of glaciers, and have reported rather contradictory conclusions: some say that glaciers can be seen scoring the rocks over which they drag stones and sand; others, that glaciers advance over loose drift without removing it. It seems to me that the chief point to remember here is that the lower end of a glacier is the very least effective part of it, in the way of erosion; that the upper-middle part is where the ice is heaviest, and where it must scour most effectively; and the broken parts, as in bergschrunds and séracs, are prob-

ably the sites of a combined action of weathering and plucking on the rock-bed. But be all this as it may, the supposition that glaciers do erode leads to the expectation of certain systematic consequences in the way of channel form, channel junctions, and so on; and these expectations are realized in so striking a manner that the supposition which leads to them must be accepted by any unprejudiced student of the question.

It is indeed difficult, in face of the reasonableness of this conclusion, to appreciate the hesitation or the opposition of those who deny the efficacy of glacial erosion because of the nature of the evidence at the lower ends of glaciers. It is precisely there that glacial erosion should be weakest; indeed, a glacier that is actively eroding in its upper and middle course might drag along so much rock waste that it would become a depositing agent in its lower course, and thus still further warrant the analogy of a glacier and a river. Nevertheless, in the time before the evidence of hanging lateral valleys was appreciated, certain observers became so fully satisfied that glaciers do not erode, that they still hold to the same conclusion and give other explanations to hanging lateral valleys than the one usually held to-day and above presented.

Kilian of Grenoble, for example, an experienced Alpine observer, explains the discordance of hanging valleys not by an erosive power but by a protective power of glaciers. He believes that in glaciated mountain districts where hanging lateral valleys occur, the trunk glacier disappeared first and left its bed at essentially the same level as that of the lateral glaciers; and that while the lateral glaciers remained to protect their beds, the evacuated bed of the trunk glacier was worn down by the ordinary agents of weather and water. The manifest difficulty about this explanation is the necessity of poising the ends of the lateral glaciers nicely at the mouths of their valleys during the long time required, not only for the deepening of the main valley by several hundred feet, but for the widening of the main valley by several thousand feet. No reason is given to account for this peculiar and highly specialized relation of surviving lateral glaciers to an extinct trunk glacier; no existing examples of the kind are pointed out. The explanation does not seem tenable.

Garwood of London, also well acquainted with the Alps, discards glacial erosion and appeals to an accelerated erosion of the main valley by a supposed tilting of the district so as to steepen the main stream without steepening the side streams. But he does not discuss his assumption carefully, to see if it must lead to the expectation of a broad, deep, U-shaped main valley, on whose side slopes the lateral valleys will abruptly open, with nothing more than narrow sluices cut in their lips; he gives no example of a non-glaciated region where a demonstrated tilting has caused an accelerated erosion of a main valley and thus left the side valleys hanging; and he offers no reason for the extraordinary association of hanging lateral valleys and glaciated mountain districts.

Heine, the most eminent of Swiss geologists, is convinced that Alpine glaciers are not effective eroding agents, and explains hanging lateral valleys by the greater erosive power of the main stream than of the side stream. To my sincere regret, he does not seem to have tested this supposition in non-glaciated regions, where the prevalence of accordant levels at the junction of mature trunk and branch valleys is one of the best attested facts of earth sculpture. It is true that very young large streams can cut down narrow gorges faster than small side streams can erode side gorges; but the discordance thus produced for a time never endures to a mature stage of valley development in non-glaciated regions. Even in so narrow and young a main valley as the Colorado canyon, the side streams enter essentially at grade. The persistence of hanging lateral valleys over broadly open main valleys in all glaciated mountains yet studied, and the absence of this highly specialized relation in all other parts of the world, cannot find an acceptable explanation by the action of normal erosive processes; it must be in some way dependent on glacial erosion, even if the processes of glacial erosion cannot yet be precisely explained.

There is, however, still another feature in which certain summits of the Sawatch range repeat the features of other glaciated ranges, and this is in the forms of its sharpened peaks and crests. The sharp La Plata peak may be taken as the type of this feature. It rises above the trough-like floors of three glaciated valleys, or channels, all of which head in steep-walled amphi-

theatres or cirques. One of these is Crystal gulch, already mentioned, which lies east of the peak, with its head under the ragged arête of a spur that trends south from the peak. A second one heads northwest of the peak; a third heads southwest of the peak; but all open northward to the valley of Lake creek. La Plata thus stands between the encroaching heads of three glacial channels, and the sharpness of the peak and of the spurs that radiate from it between the undercut channels is evidently the result of the retrogressive erosion of the channel heads or cirques, whatever the cause of this erosion may have been. A comparison of the acute forms of La Plata with the rounded forms of the Park range, directly across the Arkansas valley-basin to the east, where there has been no glacial action, leaves no doubt that the retrogressive erosion in the cirques under La Plata was accomplished while the cirques were occupied by glaciers.

This conclusion is strongly supported by an examination of Mount Elbert. Unlike La Plata, Elbert is not closely encroached upon by the cirque-heads of glacial channels; there is one on the eastern slope, and there are others on the north, but the space between them is so great that the glacial undercutting on the different sides of the mountain did not suffice to reduce it to a sharp peak; it still retains a massive dome-like outline, such as La Plata also in all probability had in pre-glacial time, and such as still prevails in the non-glaciated parts of the Park range. Here, then, is confirmation of Richter's view that the sharpness of various Alpine *dents*, *aiguilles* and *Hörner* is the result of the encroachment of glacial cirques upon formerly dome-like mountains; but while in the Alps, the transformation from dome-like to horn-like mountains has gone on so far that few dome-like masses remain to tell their story; the two forms are preserved side by side in the Sawatch range, and are mutually explanatory. It may be noted in passing that Mont Blanc, the highest of the Alps, has a dome-like summit, which the cirques have not sufficiently consumed to reduce to a peak. It may also be worth suggesting that the frequent occurrence of summits in the Rocky mountains about 14,000 feet in height may possibly be due to the destruction of loftier mountains by cirque encroachment, the level at which the glaciers worked in the

cirques being held roughly to a definite altitude by climatic control. However this may be, an excursion to the Sawatch range can leave no doubt of the great efficacy of glaciers in shaping its mountains, between valley bottom and peak top, wherever glaciers have existed.

The share of glacial erosion to be attributed to each of the several glacial epochs that are recognizable in the Twin lake district, and the work of normal inter-glacial and post-glacial erosion in effacing the marks of glacial erosion deserve more attentive study than I could give; but the impression grew on me that the successive epochs of glacial erosion served only to intensify the forms of glacial origin; that the total glacial erosion was much greater than the total inter-glacial erosion; and that post-glacial erosion is, as above indicated, relatively insignificant.

Our route westward from the upper Arkansas by the Colorado Midland railway led us over the northern part of the Sawatch range next north of Mount Massive, directly west of Leadville. The road tunnels under Hagerman pass and follows superbly glaciated valleys on both sides of the range. There are few mountain ranges in which one can find a better assortment of glaciated forms, easily accessible, than in the Sawatch, and particularly each side of Hagerman pass. This district may be heartily commended to any student who wishes to make a fine thesis on the interesting problem of mountain sculpture.

Notes on the Altitude of Mts. Columbia, Bryce, Lyell, and Forbes.

BY ARTHUR O. WHEELER.

In 1902, the Rev. James Outram ascended a number of high peaks of the Canadian Rockies and made observations with a view to ascertaining their altitude. Dr. Norman Collie and others, among whom were Messrs. Coleman, Stewart, Habel, Wilcox, Thompson, Baker, Stutfield, and Weed, had during a number of years, from 1892 to 1902, made similar observations. The general result was a decided decrease in the

previously accepted altitude of several of the highest mountains of that main range.

While conducting a topographical survey of the Selkirk range for the Canadian Government, for which purpose the method of photo-topography was employed, the writer had occasion to take a number of views from commanding Selkirk peaks in which Mts. Columbia, Bryce, Lyell, and Forbes, were readily identified. Having plotted the Selkirk triangulation, it was now attempted, as a matter of experiment, to compute from the photographs the altitude of these four mountains.

The methods employed were the same as those used in the ordinary reduction of the altitudes of points selected in photographs to enable contours to be drawn in the formation of a topographical map. The positions of the peaks were first laid down from the photographs and the distance scaled. The altitudes were next computed, and a correction applied for curvature and refraction.

In explanation, it may be said that the altitude of any point, in a photograph taken with one of the specially constructed Canadian Topographical Survey cameras, is dependent upon the relations existing between the distance such point is from the camera station, the focal length of the photograph (which is generally an enlargement from the plate used in the field), and the relative height of such point above or below the horizon plane of the station occupied.

In order to ascertain what degree of reliability might be placed upon the computation of altitudes at so great a distance, that of Chancellor peak was first determined. This altitude had previously been computed by the Topographical Survey from a series of angular readings, and established at 10,780 feet above sea level upon the maps published by the Department of the Interior. It was now computed from four views taken at different stations, and the mean result found to be 10,751 feet, or twenty-nine feet less than that previously established. The distance between the extreme stations of the views employed was a little over eighteen miles, and the mean distance to Chancellor peak about forty-five. The range of the four results was forty-four feet.

The result seemed to promise altitudes for the four northern peaks that would be a close approximation to the truth:—

The Columbia computation, made from views at four different stations, gave a mean altitude of 12,740 feet, with a range of 261 feet.

Bryce was a mean of six stations, and the resultant altitude, 11,686 feet, with a range of 235 feet.

Lyell, computed from four stations, showed a mean altitude of 11,463 feet, with a range of 271 feet.

Forbes, also from four stations, a mean altitude of 12,075 feet, with a range of 355 feet.

In each case, the extreme distance apart of the stations was a little over eighteen miles.

The large increase in the range over the computation for Chancellor peak is accounted for by the fact that, while the peak named is almost directly opposite the centre of the eighteen mile base, the lines of sight to the more northerly peaks become oblique, and consequently a greater difficulty is met in plotting their positions accurately. The average distance of "The Chancellor" from the stations occupied is about 45 miles, Forbes about 50 miles, Lyell about 52 miles, Bryce about 55 miles, and Columbia about 62 miles.

A table is hereto appended¹ giving the data obtained in connection with the computations. A second table¹ shows the comparative altitudes derived respectively by Collie, Outram, and the writer. The altitudes in the first case are taken from Dr. Collie's map appearing in the "Geographical Journal" of May, 1903. In the second case they are from APPALACHIA, Vol. X., published in May, 1903.

A sketch map showing the stations used for the computations appeared in connection with the latter.

The expedition of Messrs. Coleman and Stewart in 1892-93 placed the altitude of Mt. Brown at 9050 feet, and Mt. Hooker somewhat less. That of Messrs. Collie, Stutfield, and Weed in 1902 placed the altitude of Mt. Murchison at 11,100 feet. These results, and the above notes, show that in all published geographical maps of the present day the height of the moun-

¹ Page 408.

tains named above sea level, shown anywhere between 15,000 and 17,000 feet, is much exaggerated.

In view of the foregoing, it may be of interest to recall Dr. Hector's remarks in his journal when at the summit of the Pipe-stone pass :—

A very high peak that I saw must, I think, be the same that I saw from the west last summer, and which I named after Sir Roderick Murchison. It did not strike me as being so much higher than those around it, as when viewed from that direction, but this may be due to the craggy aspect the mountains present to the east.

However, I am inclined to think that none of the Rocky Mountains rise above 13,000 or 13,500 feet, and that my estimate of the height of Mt. Murchison, which I made last year, is too great. (Outline No. 32 gives the appearance of Mt. Murchison as seen from above yesterday's encampment.)¹



*Mt. Murchison (?) From Pipe Stone Pass, alt. 7000 ft.
6000 ft. above the eye*

¹ Hector's Journal, August 27, 1859, Palliser's report, page 149.

408 ALTITUDE OF PEAKS IN CANADIAN ROCKIES.

TABLE No. 1.

Peak Determined.	Selkirk Station, from which determined.	Computed Altitude.	Mean Range of Altitudes.	Mean Altitudes above sea level.
Mt. Columbia.	Mt. Hermit . .	12,795 feet.	261 feet.	12,740 feet.
	Névé	12,747 "		
	Beaver Overlook	12,839 "		
	Mt. Wheeler .	12,578 "		
Mt. Bryce.	Mt. Hermit . .	11,763 feet.	235 feet.	11,686 feet.
	Cougar Cr., North	11,678 "		
	Cougar Head .	11,592 "		
	Névé	11,682 "		
	Mt. Wheeler .	11,582 "		
	Beaver Overlook	11,817 "		
Mt. Lyell.	Mt. Hermit . .	11,610 feet.	271 feet.	11,463 feet.
	Mt. Wheeler .	11,339 "		
	Névé	11,383 "		
	Beaver Overlook	11,520 "		
Mt. Forbes.	Mt. Hermit . .	12,101 feet.	355 feet.	12,075 feet.
	Névé	11,989 "		
	Mt. Wheeler .	11,928 "		
	Beaver Overlook	12,283 "		
Chancellor Peak.	Mt. Wheeler .	10,770 feet.	44 feet.	10,751 feet.
	Névé	10,726 "		
	Mt. Fox . . .	10,764 "		
	Mt. Rogers . .	10,755 "		

Table computed by M. P. Bridgland, B. A., A. A. C.

TABLE No. 2.

COMPARATIVE ALTITUDES.

Peak Determined.	Collie.	Outram.	Wheeler from Selkirk Triangulation.
Mt. Columbia . . .	12,500 feet.*	12,500 feet.	12,740 feet.
Mt. Bryce	12,000 " *	11,800 "	11,686 "
Mt. Lyell	11,500 " *	11,900 "	11,463 "
Mt. Forbes	12,000 "	12,500 "	12,075 "

* Note on Dr. Collie's map: "Heights marked with an asterisk, approximate only."

NOTE. — The Selkirk deductions are of special interest in that they closely corroborate previous results obtained from a different base, and by totally different methods.

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